Philips Consumer Electronics

Technical Service Data

Service and Quality
Service Publications Dept.
One Philips Drive
P.O. Box 14810
Knoxville, TN 37914

Manual 7646
Model no.: 20PT6245/37
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Pg. SCHEMATIC DIAGRAMS AND PC BOARDS

1. Chassis Overview
2. A1 - Power Supply Schematic
3. A2 - Detlection Schematic
4. A3 - Tuner IF Schematic
5. A4 - Video Processing Schematic
6. A5 - Audio Processing (Stereo + SAP) Schematic
7. A6 - Audio Amplifier + Mono Sound Processing Schematic
8. A7 - Font I/O + Front Control + Headphone
9. A8 - Rear I/O Schematic
10. A9 - DVD Power Supply Schematic (Optional)
11. B1 - CRT Panel Schematic
12. Layout Mono Carrier: (Top Side)
13. Layout Mono Carrier (Overview Bottom Side)
14. Layout CRT Panel (Top Side)
15. Layout CRT Panel (Bottom Side)
16. Side Jack Panel Schematic
17. Layout Side Jack Panel

REFER TO SAFETY GUIDELINES

SAFETY NOTICE: ANY PERSON ATTEMPTING TO SERVICE THIS CHASSIS MUST FAMILIARIZE HIMSELF WITH THE CHASSIS AND BE AWARE OF THE NECESSARY SAFETY PRECAUTIONS TO BE USED WHEN SERVICING ELECTRONIC EQUIPMENT CONTAINING HIGH VOLTAGES.

CAUTION: USE A SEPARATE ISOLATION TRANSFORMER FOR THIS UNIT WHEN SERVICING

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Safety Notes

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GENERAL SAFETY NOTES

IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all Philips Consumer Electronics Company** equipment. The service procedures recommended by Philips and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various **CAUTIONS** and **NOTICES** which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these **CAUTIONS** and **NOTICES ARE NOT EXHAUSTIVE**. Philips could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Philips has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Philips must first satisfy himself thoroughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

** Hereafter throughout this manual, Philips Consumer Electronics Company will be referred to as Philips.

WARNING

Critical components having special safety characteristics are identified with a ⚠ or **"S"** by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematics or exploded views. Use of substitute replacement parts which do not have the same specified safety characteristics may create shock, fire, or other hazards. Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.

- Broken Line ____ _ ____ _ ____ _ ____

SAFETY CHECKS

After the original service problem has been corrected, a complete safety check should be made. Be sure to check over the entire set, not just the areas where you have worked. Some previous servicer may have left an unsafe condition, which could be unknowingly passed on to Your customer. Be sure to check all of the following:

FIRE AND SHOCK HAZARD
IMPLOSION
X-RADIATION
LEAKAGE CURRENT COLD CHECK
LEAKAGE CURRENT HOT CHECK
PICTURE TUBE REPLACEMENT

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FIRE AND SHOCK HAZARD

1. Be sure all components are positioned in such a way as to avoid the possibility of adjacent component shorts. This is especially important on those chassis which are transported to and from the service shop.

2. Never release a repaired unit unless all protective devices such as insulators, barriers, covers, strain reliefs, and other hardware have been installed in accordance with the original design.

3. Soldering and wiring must be inspected to locate possible cold solder joints, solder splashes, sharp solder points, frayed leads, pinched leads, or damaged insulation (including the ac cord). Be certain to remove loose solder balls and all other loose foreign particles.

4. Check across-the-line components and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout, lead length, and dress.

5. No lead or component should touch a receiving tube or a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces or edges must be avoided.

6. Critical components having special safety characteristics are identified with an **'S'** by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematic diagrams and /or exploded views.

7. When servicing any unit, always use a separate isolation transformer for the chassis. Failure to use a separate isolation transformer may expose you to possible shock hazard, and may cause damage to servicing instruments.

8. Many electronic products use a polarized ac line cord (one wide pin on the plug). Defeating this safety feature may create a potential hazard to the servicer and the user. Extension cords which do not incorporate the polarizing feature should never be used.

9. After reassembly of the unit, always perform an ac leakage test or resistance test from the line cord to all exposed metal parts of the cabinet. Also, check all metal control shafts (with knobs removed), antenna terminals, handles, screws, etc., to be sure the unit may be safely operated without danger of electrical shock.

*** Broken line** ____ _ ____ _ ____ _ ____

IMPLOSION

1. All picture tubes used in current model receivers are equipped with an integral implosion system. Care should always be used, and safety glasses worn, whenever handling any picture tube. Avoid scratching or otherwise damaging the picture tube during installation.

2. Use only replacement tubes specified by the manufacturer.

X-RADIATION

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1. Be sure procedures and instructions to all your service personnel cover the subject of X-radiation. Potential sources of X-rays in TV receivers are the picture tube and the high voltage circuits. The basic precaution which must be exercised is to keep the high voltage at the factory recommended level.

2. To avoid possible exposure to X-radiation and electrical shock, only the manufacturer's specified anode connectors must be used.

3. It is essential that the service technician has an accurate HV meter available at all times. The calibration of this meter should be checked periodically against a reference standard.

4. When the HV circuitry is operating properly there is no possibility of an X-radiation problem. High voltage should always be kept at the manufacturer's rated value - no higher - for optimum performance. Every time a color set is serviced, the brightness should be run up and down while monitoring the HV with a meter to be certain that the HV is regulated correctly and does not exceed the specified value. We suggest that you and your technicians review test procedures so that HV and HV regulation are always checked as a standard servicing procedure, and the reason for this prudent routine is clearly understood by everyone. It is important to use an accurate and reliable HV meter. It is recommended that the HV reading be recorded on each customer's invoice, which will demonstrate a proper concern for the customer's safety.

5. When troubleshooting and making test measurements in a receiver with a problem of excessive high voltage, reduce the line voltage by means of a Variac to bring the HV into acceptable limits while troubleshooting. Do not operate the chassis longer than necessary to locate the cause of the excessive HV.

6. New picture tubes are specifically designed to withstand higher operating voltages without creating undesirable X-radiation. It is strongly recommended that any shop test fixture which is to be used with the new higher voltage chassis be equipped with one of the new type tubes designed for this service. Addition of a permanently connected HV meter to the shop test fixture is advisable. The CRT types used in these new sets should never be replaced with any other types, as this may result in excessive X-radiation.

7. It is essential to use the specified picture tube to avoid a possible X-radiation problem.

8. Most TV receivers contain some type of emergency "Hold Down" circuit to prevent HV from rising to excessive levels in the presence of a failure mode. These various circuits should be understood by all technicians servicing them, especially since many hold down circuits are inoperative as long as the receiver performs normally.

LEAKAGE CURRENT COLD CHECK

1. Unplug the ac line cord and connect a jumper between the two prongs of the plug.

2. Turn on the power switch.

3. Measure the resistance value between the jumpered ac plug and all exposed cabinet parts of the receiver, such as screw heads, antennas, and control shafts. When the exposed metallic part has a return path to the chassis, the reading should be between 1 megohm and 5.2 megohms. When the exposed metal does not have a return path to the chassis, the reading must be infinity. Remove the jumper from the ac line cord.

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LEAKAGE CURRENT HOT CHECK

1. Do not use an isolation transformer for this test. Plug the completely reassembled receiver directly into the ac outlet.

2. Connect a **1.5k, 10W resistor** paralleled by a **0.15uF. capacitor** between each exposed metallic cabinet part and a **good earth ground** such as a water pipe, as shown below.

3. Use an ac voltmeter with at least 5000 ohms/volt sensitivity to measure the potential across the resistor.

4. The potential at any point should not exceed 0.75 volts. A leakage current tester may be used to make this test; leakage current must not exceed 0.5milliamp. If a measurement is outside of the specified limits, there is a possibility of shock hazard. The receiver should be repaired and rechecked before returning it to the customer.

5. **Repeat the above procedure with the ac plug reversed.** (Note: An ac adapter is necessary when a polarized plug is used. Do not defeat the polarizing feature of the plug.)

OR

With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. **(Do not use an isolation transformer during this test.)** Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.1 Leakage Current for Appliances and Underwriters Laboratories (UL) 1410, (50.7). **With the instrument AC switch first in the on position and then in the off position, measure from a known earth ground (metal water pipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle brackets, metal cabinet, screw heads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milliamp. Reverse the instrument power cord plug in the outlet and repeat the test. See graphic below.**

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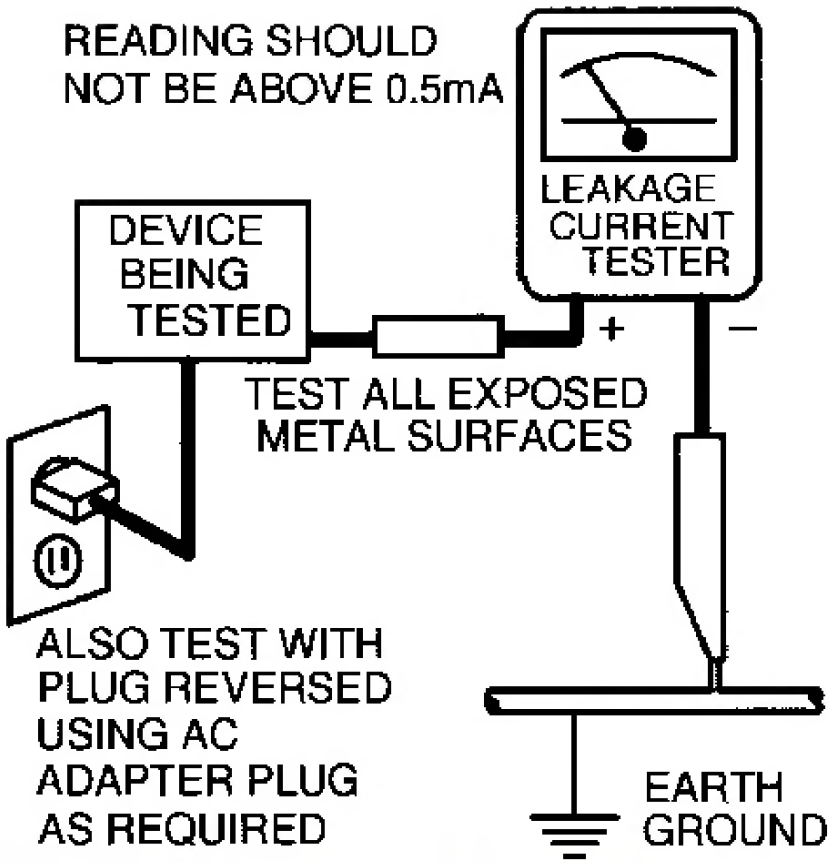

PICTURE TUBE REPLACEMENT

The primary source of X-radiation in this television receiver is the picture tube. The picture tube utilized in this chassis is specially constructed to limit X-radiation emissions. For continued X-radiation protection, the replacement tube must be the same type as the original, including suffix letter, or a Philips approved type.

PARTS REPLACEMENT

Many electrical and mechanical parts in Philips television sets have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The use of a substitute part which does not have the same safety characteristics as the Philips recommended replacement part shown in this service manual may create shock, fire, or other hazards

TV SAFETY NOTES

SAFETY CHECKS
IMPLOSION

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X-RADIATION
PICTURE TUBE REPLACEMENT
PARTS REPLACEMENT

WARNING

Before removing the CRT anode cap, turn the unit **OFF** and short the **HIGH VOLTAGE** to the **CRT DAG** ground.

SERVICE NOTE: The **CRT DAG** is not at chassis ground.

TV-VCR COMBI SAFETY NOTES

IMPORTANT SAFETY PRECAUTIONS

Prior to shipment from the factory, our products are strictly inspected for recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

SAFETY PRECAUTIONS FOR TV CIRCUITS

1. Before returning an instrument to the customer, always make a safety check of the entire instrument, including, but not limited to, the following items:

   a. Be sure that no built-in protective devices are defective or have been defeated during servicing. (1) Protective shields are provided on this chassis to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience. (2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning. Servicers who defeat safety features or fail to perform safety checks may be liable for any resulting damage.

   b. Be sure that there are no cabinet openings through which an adult or child might be able to insert their fingers and contact a hazardous voltage. Such openings include, but are not limited to, (1) spacing between the picture tube and the cabinet mask, (2) excessively wide cabinet ventilation slots, and (3) an improperly fitted and/or incorrectly secured cabinet back cover.

   c. Do a LEAKAGE CURRENT CHECK

   ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER OR BEFORE CONNECTING THE ANTENNA OR ACCESSORIES.

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d. **X-Radiation and High Voltage Limits** - Because the picture tube is the primary potential source of X-radiation in solid-state TV receivers, it is specially constructed to prohibit X-radiation emissions. For continued X-radiation protection, the replacement picture tube must be the same type as the original. Also, because the picture tube shields and mounting hardware perform an X-radiation protection function, they must be correctly in place. High voltage must be measured each time servicing is performed that involves B+, horizontal deflection or high voltage. Correct operation of the X-radiation protection circuits also must be reconfirmed each time they are serviced. (X-radiation protection circuits also may be called "horizontal disable" or "hold down.") Read and apply the high voltage limits and, if the chassis is so equipped, the X-radiation protection circuit specifications given on instrument labels and in the **Product Safety & X-Radiation** Warning note on the service data chassis schematic. High voltage is maintained within specified limits by close tolerance safety-related components/adjustments in the high-voltage circuit. If high voltage exceeds specified limits, check each component specified on the chassis schematic and take corrective action.

2. Read and comply with all caution and safety-related notes on or inside the receiver cabinet, on the receiver chassis, or on the picture tube.

3. **Design Alteration Warning** - Do not alter or add to the mechanical or electrical design of this TV receiver. Design alterations and additions, including, but not limited to circuit modifications and the addition of items such as auxiliary audio and/or video output connections, might alter the safety characteristics of this receiver and create a hazard to the user. Any design alterations or additions will void the manufacturer's warranty and may make you, the servicer, responsible for personal injury or property damage resulting therefrom.

4. **Picture Tube Implosion Protection Warning** - The picture tube in this receiver employs integral implosion protection. For continued implosion protection, replace the picture tube only with one of the same type number. Do not remove, install, or otherwise handle the picture tube in any manner without first putting on shatterproof goggles equipped with side shields. People not so equipped must be kept safely away while picture tubes are handled. Keep the picture tube away from your body. Do not handle the picture tube by its neck. Some "in-line" picture tubes are equipped with a permanently attached deflection yoke; because of potential hazard, do not try to remove such "permanently attached" yokes from the picture tube.

5. **Hot Chassis Warning**

a. Some TV receiver chassis are electrically connected directly to one conductor of the ac power cord and may be serviced safely without an isolation transformer only if the ac power plug is inserted so that the chassis is connected to the ground side of the ac power source. To confirm that the ac power plug is inserted correctly, with an ac voltmeter, measure between the chassis and a known earth ground. If a voltage reading in excess of 1.OV is obtained, remove and reinsert the ac power plug in the opposite polarity and again measure the voltage potential between the chassis and a known earth ground.

b. Some TV receiver chassis normally have 85Vac (RMS) between chassis and earth ground regardless of the ac plug polarity. This chassis can be safety-serviced only with an isolation transformer inserted in the power line between the receiver and the ac power source, for both personnel and test equipment protection. Some TV receiver chassis have a secondary ground system in addition to the main chassis ground. This secondary ground system is not isolated from the ac power line. The two ground systems are electrically separated by insulation material that must not be defeated or altered.

6. Observe original lead dress. Take extra care to assure correct lead dress in the following areas: **a.** near sharp edges, **b.** near thermally hot parts - be sure that leads and components do not touch

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thermally hot parts, **c.** the ac supply, **d.** high voltage, and **e.** antenna wiring. Always inspect in all areas for pinched, out of place, or frayed wiring. Check ac power cord for damage.

7. Components, parts, and/or wiring that appear to have overheated or are otherwise damaged should be replaced with components, parts, or wiring that meet original specifications. Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.

PRECAUTIONS DURING SERVICE

A. Parts identified by the ⚠ symbol are critical for safety. Replace only with part number specified.

B. In addition to safety, other parts and assemblies are specified for conformance with regulations applying to spurious radiation. These must also be replaced only with specified replacements.
Examples: RF converters, RF cables, noise blocking capacitors, and noise blocking filters, etc.

C. Use specified internal wiring. Note especially:
1) Wires covered with PVC tubing
2) Double insulated wires
3) High voltage leads

D. Use specified insulating materials for hazardous live parts. Note especially:
1) Insulation Tape
2) PVC tubing
3) Spacers
4) Insulators for transistors

E. When replacing ac primary side components (transformers, power cord, etc.), wrap ends of wires securely about the terminals before soldering.

F. Observe that the wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

G. Check that replaced wires do not contact sharp edged or pointed parts.

H. When a power cord has been replaced, check that 10-15 kg of force in any direction will not loosen it.

I. Also check areas surrounding repaired locations.

J. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

K. **Crimp type wire connector**
When replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, in order to prevent shock hazards, perform carefully and precisely the following steps.

Replacement procedure
1) Remove the old connector by cutting the wires at a point close to the connector. **Important:** Do not re-use a connector (discard it).

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2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.
3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.
4) Use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

L. When connecting or disconnecting the VCR connectors, first, disconnect the ac plug from the ac supply socket.

SAFETY CHECK AFTER SERVICING

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

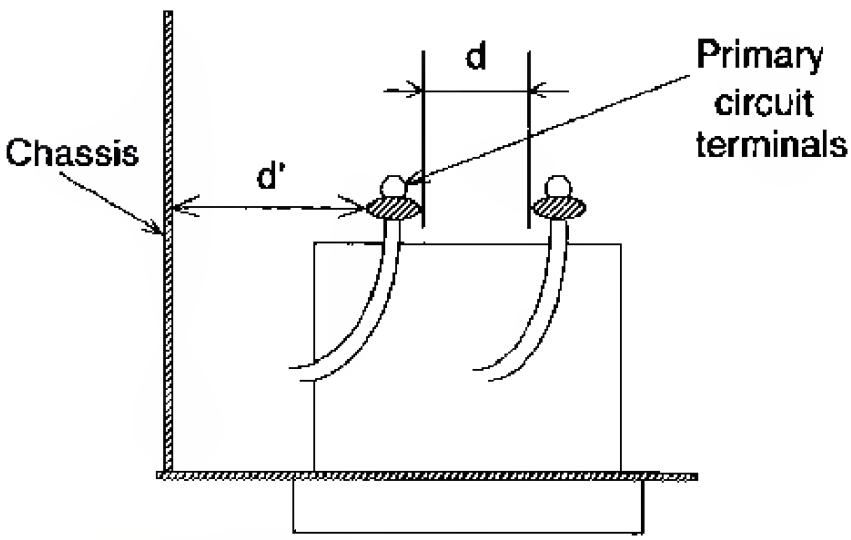
1. **Clearance Distance**

When replacing primary circuit components, confirm specified clearance distance (d) and (d') between soldered terminals, and between terminals and surrounding metallic parts. (See graphic bllow)

Table 1 : Ratings for selected area

AC Line Voltage	Region	Clearance Distance (d) (d')
110 to 130 V	USA or CANADA	> 3.2 mm (0.126 inches)

Note: This table is unofficial and for reference only. Be sure to confirm the precise values.



2. LEAKAGE CURRENT CHECKS

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VCR SAFETY NOTES

FIRE & SHOCK HAZARD (VCR)

1. Be sure that all components are positioned in such a way to avoid possibility of shorts to adjacent components. This is especially important on those chassis which are transported to and from the repair shop.

2. Always replace all protective devices such as insulators and barriers after working on a set.

3. Check for damaged insulation on wires including the ac cord.

4. Check across-the-line components for damage and replace if necessary.

5. After re-assembly of the unit, always perform an ac leakage test on the exposed metallic parts of the cabinet such as the knobs, antenna terminals, etc. to be sure the set is safe to operate without danger of electrical shock. **Do not use a line isolation transformer during this test.** Use an ac voltmeter having 5000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm 10 wan resistor, paralleled by 0.15 MFD ac type capacitor, between a known good earth ground (water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the ac voltage across the combination 1500 ohm resistor and 0.15 MFD capacitor. Reverse the ac plug on the set and repeat ac voltage measurements again for each exposed metallic part. Voltage measured must not exceed O.6 volts R.M.S. This corresponds to 0.4 milliamp ac. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.

GENERAL

Power Supply-This receiver is designed for operation on 120 Volts, 6OHz alternating current (ac) only. Never connect to a supply having a different frequency or voltage.

IMPORTANT NOTICE

This device employs many circuits, components, and mechanical parts designed for protection against fire, shock and RF interference. For continued safety any servicing should be performed by qualified personnel and exact replacement parts should be used. Under no circumstances should the original design be altered.

PRODUCT SAFETY GUIDELINES FOR ALL PRODUCTS

CAUTION: Do not modify any circuit. Service work should be performed only after you are thoroughly familiar with all of the following safety checks. Risk of potential hazards and injury to the user increases if safety checks are not adhered to.
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PREVENTION OF ELECTROSTATIC DISCHARGE (ESD)

Some semiconductor solid state devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices, Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by electrostatic discharge (ESD).

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any ESD on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging ESD wrist strap, which should be removed for potential shock reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.

3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.

4. Use only an anti-static solder removal device. Some solder removal devices not classified as "antistatic (ESD protected)" can generate an electrical charge sufficient to damage ES devices.

5. Do not use freon·propelled chemicals. These can generate electrical charges sufficient to damage ES devices.

6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).

7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION : Be sure no power is applied to the chassis or circuit and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your feet from a carpeted floor can generate static electricity (ESD) sufficient to damage an ES device.)

NOTE to CATV system Installer:
This reminder is provided to call the CATV system installer's attention to article 820-22 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

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Mechanical Assembly

REFER TO SAFETY GUIDELINES

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4. Mechanical Instructions

Index:

1. Rear cover removal.
2. Service Position Main panel.
3. Rear cover mounting.

4.1 Rear Cover Removal

1. Remove all fixation screws of the rear cover.
2. Now pull the rear cover in backward direction to remove it.

4.2 Service Position Main Panel

1. Disconnect the strain relief of the AC power cord.
2. Remove the main panel, by pushing the two center clips outward [1]. At the same time pull the panel away from the CRT [2].
3. If necessary disconnect the degaussing coil by removing the cable from (red) connector 0212.
4. Move the panel somewhat to the left and flip it 90 degrees [3], with the components towards the CRT.

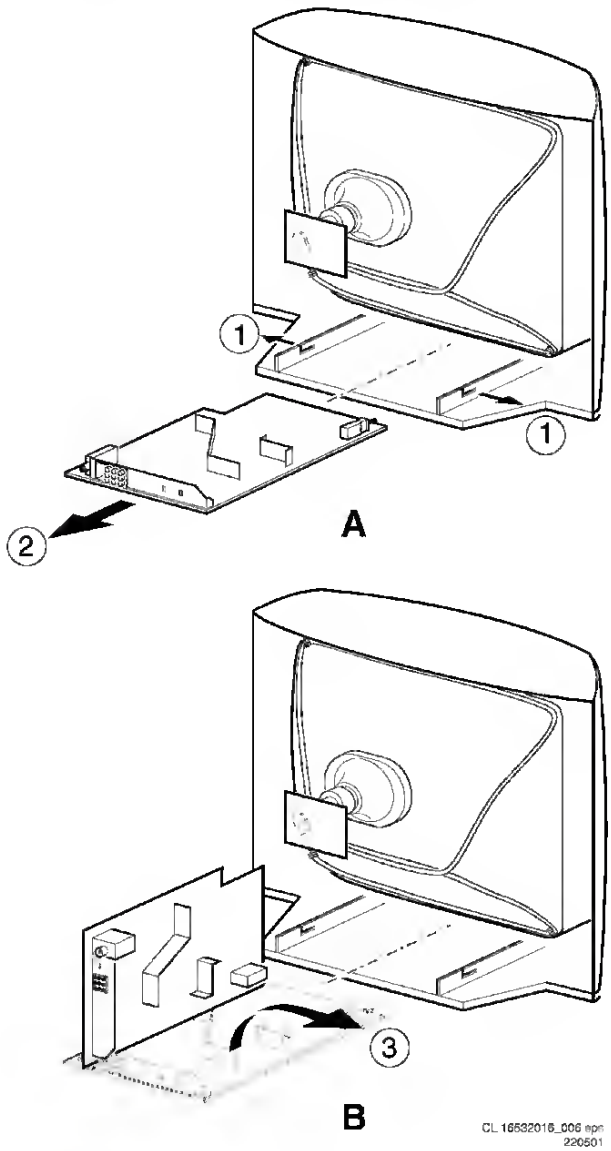

Figure 4-1 Service Position

4.3 Rear Cover Mounting

Before you mount the rear cover, perform the following checks:

1. Check whether the mains cord is mounted correctly in its guiding brackets.
2. Re-place the strain relief of the AC power cord into the cabinet.
3. Check whether all cables are replaced in their original position

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Troubleshooting

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Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or Ixxx. On the PCB, test points are specifically mentioned in the service manual as "half moons" with a dot in the center.

Table 5-1 Test Point Overview

TEST POINT	CIRCUIT	DIAGRAM
Fxxx, Ixxx	POWER SUPPLY	A1
Fxxx, Ixxx	Deflection	A2
Fxxx, Ixxx	TUNER & IF	A3
Fxxx, Ixxx	VIDEO PROCESSING	A4
Fxxx, Ixxx	AUDIO PROCESSING	A5
Fxxx, Ixxx	AUDIO AMPLIFIER + MONO SOUND PROCESSING	A6
Fxxx, Ixxx	FRONT IO + FRONT CONTROL + HEAD-PHONE	A7
Fxxx, Ixxx	DVD POWER SUPPLY	A9
Fxxx, Ixxx	CRT PANEL	B1

Perform measurements under the following conditions:

- Service Default Alignment Mode.
- Video: color bar signal.
- Audio: 3 kHz left, 1 kHz right.

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Service Modes

Service Default Alignment Mode (SDAM) offers several features for the service technician.

There is also the option of using ComPair, a hardware interface between a computer (see requirements) and the TV chassis. It offers the ability of structured trouble shooting, error code reading and software version readout for all chassis. Requirements: To run ComPair on a computer (laptop or desktop) requires, as a minimum, a 486 processor, Windows 3.1 and a CD-ROM drive. A Pentium Processor and Windows 95/98 are however preferred (see also paragraph 5.4).

Table 5-2 SW Cluster

SW Cluster	Software mane	UOC type	UOC Diversity	Special Features
L3SUS1	L03US1 x.y	TDA9377	55K ROM Size	Stereo
L3SUS2	L03US2 x.y	TDA9377	55K ROM Size	Magnavox Stereo
Abbreviations in Software name. U = Nefta, S = Stereo.				

Service Default Alignment Mode (SDAM)

Purpose

- To change option settings.
- To create a predefined setting to get the same measurement results as given in this manual.
- To display / clear the error code buffer.
- To override SW protections.
- To perform alignments.
- To start the blinking LED procedure.

Specifications

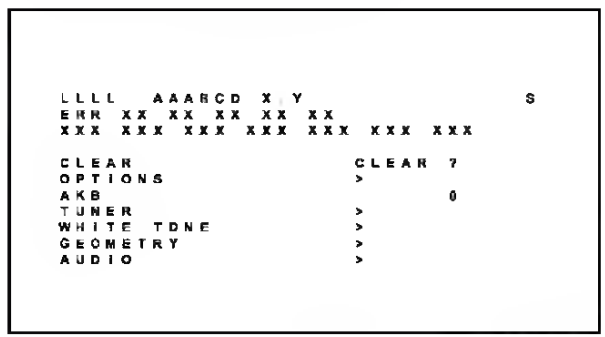
- Tuning frequency: 61.25 MHz (channel 3) for NTSC-sets (Nafta).
- Color system: NTSC-M.
- All picture settings at 50 % (brightness, color contrast, hue).
- Bass, treble end balance et 50 %; volume et 25 %.
- All service-unfriendly modes (if present) are disabled, like:
  - (Sleep) timer,
  - Child/parantal lock,
  - Blue mute,
  - Hotel/hospitality mode
  - Auto switch-off (when no "IDENT" video signal is received for 15 minutes),
  - Skip / blank of non-favorite presets / channels,
  - Auto store of personal presets,
  - Auto user menu time-out.
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to enter SDAM

Use one of the following methods.

- Use a standard customer RC-transmitter and key in the code 062596 directly followed by the "M" (menu) button or
- Short jumper wires 9257 and pin 4 of 7200 on the mono carrier (see Fig. 8-1) and apply AC power. Then press the power button (remove the short after start-up).
- Caution: Entering SDAM by shorten wires 9257 and pin 4 of 7200 will override the +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could leed to demaging the set.
- Or via ComPair.

After entering SDAM, the following screen is visible, with S at the upper right side for recognition.



CL 36532044_033.eps 130603

Figure 5-1 SDAM Menu

- **LLLL.** This is the operation hours counter. It counts the normal operation hours, not the standby hours.

- **AAABCD-X.Y.** This is the software identification of the main micro controllar:
  - A = the project name (L03).
  - B = the region: E= Europe, A= Asie Pacific, U= NAFTA, L= LATAM.
  - C = the feature of software diversity: N = stereo non-DBX, S = stereo dBx, M = mono, D = DVD
  - D = the language cluster number:
  - X = the main software version number.
  - Y = the sub software version number.
- **S.** Indication of the actual mode. S= SDAM= Service Default Alignment mode.
- **Error buffers.** Five errors possible.
- **Option bytes.** Seven codes possible.
- **Clear.** Erase the contents of the error buffer. Select the CLEAR menu item and press the CURSOR RIGHT key. The content of the error buffer is cleared.
- **Options.** To set the Option Bytes. See chapter 8.3.1 for a detailed description.
- **AKB.** Disabla (0) or anable (1) the "black current loop" (AKB = Auto Kine Bias).
- **Tuner.** To align the Tuner. See chapter 8.3.2 for a detailed description.
- **White Tone.** To align the White Tone. See chaptar 8 3.3 for a detailed description.
- **Geometry.** To align the set geometry. See chapter 8.3.4 for e detailed description.
- **Audio. Use default value (Stereo set only),** align when necessary. See chapter 8 3.x for a detailed description.

<<<<<<<

How to navigate

- In SDAM, select menu items with the CURSOR UP/DOWN key on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move tha CURSOR UP/DOWN key to display tha next / previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- When you press the MENU button twice, the set will switch to the normel user menus (with the SDAM mode still active in the background). To return to the SDAM menu press the OSD / STATUS button.
- When you press the MENU key in a submenu, you will return to the previous menu.

How to store settings

To store settings, leave the SDAM mode with the Standby button on the remote.

How to exit

Switch the set to STANDBY by pressing the power button on the remote control (if you switch the set 'off' by removing the AC power, the set will return in SDAM when AC power is re-applied). The error buffer is **not** cleared.

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Problem Solving Tips

Picture Problems

Note: Below described problems are all related to the TV settings. The procedures to change the value (or status) of the different settings are described.

No colors / noise in picture

1. Press the MENU button on the remote control.
2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

Colors not correct / unstable picture

1. Press the MENU button on the remote control.
2. Select the INSTALLATION sub menu.
3. Select and change the SYSTEM setting until picture and sound are correct.
4. Select the STORE menu item.

Picture too dark or too bright

Increase / decrease the BRIGHTNESS and / or the CONTRAST value when:

- The picture improves after you have pressed the "Smart Picture" button on the remote control.
- The picture improves after you have switched on the Customer Service Mode

The new "Personal" preference value is automatically stored.

White line around picture elements and text

Decrease the SHARPNESS value when:

- The picture improves after you have pressed the "Smart Picture" button on the remote control.

The new "Personal" preference value is automatically stored.

Snowy picture

- No or bad antenna signal. Connect a proper antenna signal.
- Antenna not connected. Connect the antenna.
- No channel / pre-set is stored at this program number. Go to the INSTALL menu and store a proper channel at this program number.
- The tuner is faulty (in this case the CODES line will contain error number 10). Check the tuner and replace / repair if necessary.

Snowy picture and/or unstable picture

- A scrambled or decoded signal is received.

Black and white picture

Increase the COLOR value when:

- The picture improves after you have pressed the "Smart Picture" button on the remote control.

The new "Personal" preference value is automatically stored.

Menu text not sharp enough

Decrease the CONTRAST value when:
The picture improves after you have pressed the "Smart Picture" button on the remote control.
The new "Personal" preference value is automatically stored.

Sound Problems

No sound or sound too loud (after channel change / switching on)

Increase / decrease the VOLUME level.
Press the Smart Sound button repeatedly to access 4 different types of sound settings and choose your desired setting.

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ComPair

Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself because ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
In case of the L01 chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector (located on the Main panel, see also figure 8-1 suffix D).

The ComPair faultfinding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- **Automatic** (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the TV-set.
- **Manually** (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extends. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the faultfinding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some **additional features** like:

- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink. **Example**: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier.*
  - Click on the 'Panel' hyperlink to automatically show the PWB with a highlighted capacitor C2568.
  - Click on the 'Schematic' hyperlink to automatically show the position of the highlighted capacitor.

How To Connect ComPair

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with "PC") of the ComPair interface.
3. Connect the AC power adapter to the supply connector (marked with "POWER 9V DC") on the ComPair interface.
4. Switch the ComPair interface OFF.
5. Switch the television set OFF (remove the AC power).
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with "I2C") and the ComPair connector on the mono carrier (see figure 8-1 suffix D).
7. Plug the AC power adapter in the AC power outlet and switch on the interface. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the "introduction" chapter.

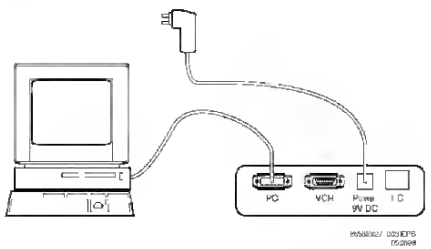

Figure 5-2 ComPair connection

How To Order

ComPair order codes:

- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631.
- Starter kit ComPair32 software (registration version): 3122 785 60040.
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070.
- SearchMan32 CD (update): 3122 785 60080.
- ComPair interface cable: 3122 785 90004.

Error Buffer

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is written at the left side and all other errors shift one position to the right.

How To Read The Error Buffer

You can read the error buffer in 3 ways:

- On screen via the SDAM (only if you have a picture). Examples:
  - ERROR: 0 0 0 0 0: No errors detected.
  - ERROR: 6 0 0 0 0: Error code 6 is the last and only detected error.
  - ERROR: 9 6 0 0 0: Error code 6 was first detected and error code 9 is the last detected (newest) error.
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

How To Clear The Error Buffer

The error code buffer is cleared in the following cases:

- By activation of the CLEAR command in the SDAM menu.
- If the content of the error buffer has not changed for 50 hours, it resets automatically.

Note:
When leaving SDAM by disconnecting the set from AC power, the error buffer is not reset.

Error Codes

In case of non-intermittent faults, clear the error buffer before you begin the repair. These to ensure that old error codes are no longer present.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

Table 5-3 Error Code Table

ERROR	Device	Error description	Check item	Diagram
0	Not applicable	No Error	-	-
1	Not applicable	X-Ray Protection (USA)	7421, 2423,6421, 6422	A2
2	Not applicable	Horizontal Protection	7421, 7422, 7423	A2
3	Not applicable	Vertical Protection	7461, 7462, 7463, 7464, 7465, 7466	A2
4	AN5891K & AN5829S	Tone control & Audio processor I2C identification error	7821 (tone IC), 7841 (Stereo/Sap)	A5
5	TDA93XX	POR 3.3V / 8V Protection	7200, 7541, 7491, 7493, 7496	A4, A1
6	I2C bus	General I2C bus error	7200, 3604, 3605	A4
7	Not applicable	-	-	-
8	Not applicable	E/W Protection (Large Screen)	-	-
9	M24C16	NVM I2C identification error	7841, 3641, 3642, 3643	A4
10	Tuner	Tuner I2C identification error	1000, 3003, 3004	A3
11	Not applicable	Black current loop protection	3313, 7307, 7308, 7309, 7310, 7311, 7312, 7313, 7314, 7315, 7316, 7317, 7318, CRT	B1
12	Not applicable	MAP I2C identification error (USA)	-	-
13	Not applicable	VC I2C identification error (Eu)	-	-
14	Not applicable	DVD I2C identification error	-	-

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The Blinking LED Procedure

Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.

When the SDAM is entered, the LED will blink the contents of the error-buffer.

- n short blinks (n = 1 - 14),
- When all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
- The sequence starts again.

.

Example of error buffer: 12 9 6 0 0
After entering SDAM:

- 12 short blinks followed by a pause of 3 s,
- 9 short blinks followed by a pause of 3 s,
- 6 short blinks followed by a pause of 3 s,
- 1 long blink of 3 s to finish the sequence,
- the sequence starts again.

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Protections

If a fault situation is detected an error code will be generated and if necessary the set will be put in the protection mode. Blinking of the red LED at a frequency of 3 Hz indicates the protection mode. In some error cases, the microprocessor does not put the set in the protection mode. The error codes of the error buffer can be read via the service menu (SDAM), the blinking LED procedure or via ComPair.

To get a quick diagnosis the chassis has one service modes implemented:

- The Service Default Alignment Mode (SDAM). Start-up of the set in a predefined way and adjustment of the set via a menu and with the help of test patterns.

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Repair Tips

Below some failure symptoms are given, followed by a repair tip.

- **Set is dead and makes hiccupping sound.** "Main Supply" is available. Hiccupping stops when de-soldering L5563, meaning that problem is in the "Main Supply" line. No output voltages at LOT, no horizontal deflection. Reason: line transistor 7421 is defective.
- **Set is dead, and makes no sound.** Check power supply IC 7520. Result: voltage at pins 2, 6, 7, 9 and 11 are about 180 V and pin 14 is 0 V. The reason why the voltage on these pins is so high is because the output driver (pin 11) has an open load. That is why MOSFET 7521 is not able to switch. Reason: feedback resistor 3523 is defective. **Caution:** be careful measuring on the gate of 7521; circuitry is very high ohmic and can easily be damaged!
- **Set is in hiccup mode and shuts down after 8 s.** Blinking LED (set in SDM mode) indicates error 5. As it is unlikely that the "POR" and "+8V protection" happen at the same time, measure the "+8V". If this voltage is missing, check transistor 7491 & 7496.
- **Set is non-stop in hiccup mode.** Set is in over current mode; check the secondary sensing (opto coupler 7515) and the "Main Supply" voltage. Signal "Stdby_con" must be logic low under normal operation conditions and goes to high (3.3 V) under standby and fault conditions.
- **Set turns on, but without picture and sound.** The screen shows snow, but OSD and other menus are okay. Blinking LED procedure indicates error 11, so problem is expected in the tuner (pos. 1000). Check presence of supply voltages. As "Vlotaux+5V" at pin 5 and 7 are okay, "VT_supply" at pin 9 is missing. Conclusion: resistor 3449 & 3450 are defective

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Philips Consumer Electronics

Technical Service Data

Service and Quality
Service Publications Dept.
One Philips Drive
P.O. Box 14810
Knoxville, TN 37914

Manual 7646
Model no.: 20PT6245/37
First Publish: 04-21-2005
Rev. Date: 05-18-2005
Print Date: 1/20/2006

Electrical Adjustments

REFER TO SAFETY GUIDELINES

SAFETY NOTICE: ANY PERSON ATTEMPTING TO SERVICE THIS CHASSIS MUST FAMILIARIZE HIMSELF WITH THE CHASSIS AND BE AWARE OF THE NECESSARY SAFETY PRECAUTIONS TO BE USED WHEN SERVICING ELECTRONIC EQUIPMENT CONTAINING HIGH VOLTAGES.

CAUTION: USE A SEPARATE ISOLATION TRANSFORMER FOR THIS UNIT WHEN SERVICING

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8. Alignments

Index of this chapter
1 General Alignment Conditions
2 Hardware Alignments
3 Software Alignments and Settings

Note: The Service Default Alignment Mode (SDAM) is described in the "Service Modes, Error Codes and Fault Finding" section. SDAM menu navigation is performed by using the MENU UP, MENU DOWN, MENU LEFT, and MENU RIGHT keys of the remote control transmitter.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:
- AC voltage and frequency: according to country's standard.
- Connect the television set to the AC power via an isolation transformer.
- Allow the television set to warm up for approximately 20 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). Never use heatsinks as ground.
- Test probe: Ri > 10 M ohm; Ci < 2.5 pF.
- Use an isolated trimmer/screwdriver to perform the alignments.

8.2 Hardware Alignments

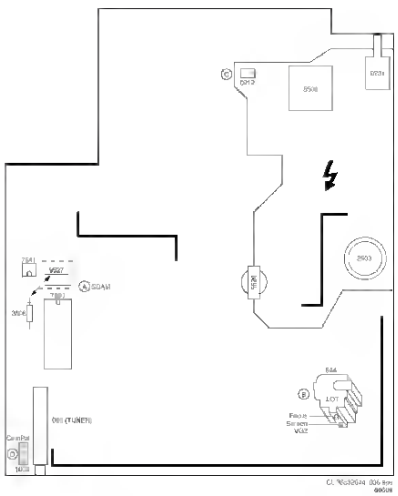

Figure 8-1 Top view family board

8.2.1 Vg2 Adjustment

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the WHITE TONE sub menu.
3. Press the MENU LEFT/RIGHT key to enter the WHITE TONE sub menu.
4. In the WHITE TONE sub menu, press the MENU UP/DOWN keys to select NORMAL RED, NORMAL GREEN, or NORMAL BLUE.
5. Use the MENU LEFT/RIGHT keys to set the values of NORMAL RED, NORMAL GREEN and NORMAL BLUE to '40'.
6. Press the MENU button twice to enter the normal user menu.
7. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
8. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
9. Use the MENU UP/DOWN keys to select CONTRAST. Be sure to record the current value of CONTRAST.
10. Use the MENU LEFT/RIGHT keys to set the value of CONTRAST to '0'.
11. Use the MENU UP/DOWN keys to select BRIGHTNESS. Be sure to record the current value of BRIGHTNESS.
12. Use the MENU LEFT/RIGHT keys to set the value of BRIGHTNESS to minimum (OSD just visible in a dark room).
13. Press the MENU button twice to return to the top level SDAM menu.
14. Press the OSD/STATUS button to hide the SDAM onscreen display ('S' indication remains visible). This, to avoid interferences during the waveform measurements.
15. Connect the RF output of a video pattern generator to the antenna input, and input a 'black picture' test pattern to the television set.
16. Set the oscilloscope to 50 V/div and the time base to 0.2 milliseconds (external triggering on the positive vertical pulse with a 10:1 probe).
17. Ground the scope at the CRT panel and connect a 100:1 probe to one of the cathodes of the picture tube socket (pin 7= Red, pin 9= Green, and pin 3= Blue; see also schematic diagram B1). Measure the level of the black current measuring pulses. These are the second line (Red), third line (Green), and fourth line (Blue) directly after the frame blanking (see figure "V_cut-off").
    Remark This chassis is using a TDA93XX UOC series. These use two different measuring pulses at each of the R, G, and B outputs. The above-mentioned level applies to the pulse with the lowest level of each gun.
18. Select the cathode with the highest V_dc value for the alignment. Adjust the V_cut-off of this gun with the SCREEN potentiometer (see figure 'Top view family board') on the LOT to the correct value (see table "Vg2 alignment values").
19. Press the OSD/STATUS button to display the SDAM onscreen display.
20. Press the MENU button to enter the normal user menu.
21. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
22. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
23. Use the MENU UP/DOWN keys to select CONTRAST.
24. Use the MENU LEFT/RIGHT keys to reset the value of CONTRAST to the original value.
25. Use the MENU UP/DOWN keys to select BRIGHTNESS.
26. Use the MENU LEFT/RIGHT keys to reset the value of BRIGHTNESS to the original value.
27. Press the MENU button twice to return to the top level SDAM menu.
28. Use the POWER button on the remote control transmitter or the POWER button on the television set to turn off the television set. This will save the changes made in SDAM.

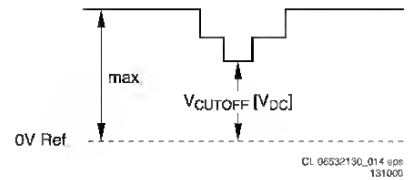

Figure 8-2 V_cutoff

Table 8-1 Vg2 alignment values

Screen Size	Cut-off point (V)
14RF	+135 V ± 4 V
20V	+140 V ± 4 V
20RF	+140 V ± 4 V

8.2.2 Focusing

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a circle or crosshatch test pattern to the television set.
3. Press the SMART PICTURE button on the remote control transmitter repeatedly to choose NATURAL (or MOVIES) picture mode.
4. Adjust the FOCUS potentiometer (see figure 'Top view family board") until the vertical lines near the left and right sides of the screen, and near the horizontal center of the screen, are at minimum width without visible haze.

8.3 Software Alignments and Settings

The following options are performed in the Service Default Alignment Mode (SDAM). SDAM is described in the "Service Modes, Error Codes and Fault Finding" section.
The following alignments are explained:
1 OPTIONS
2 TUNER
3 WHITE TONE
4 GEOMETRY
5 AUDIO

8.3.1 OPTIONS

Options are used to control the presence or absence of certain features and hardware.

Note: Each option byte controls several features of the television set, therefore, before changing option byte information, it is important to record the current option byte values. This ensures that the television features can be restored to the original settings, if necessary.

How to Change an Option Byte
An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very fast. All options are controlled via seven option bytes. Select the option byte (OP 1 .. OP 7) with the MENU UP/DOWN keys, and enter the new value.

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the OPTIONS sub menu.
3. Press the MENU LEFT or MENU RIGHT key to enter the OPTIONS sub menu.
4. In the OPTIONS sub menu, press the MENU UP/DOWN keys to select 'OP 1' through 'OP 7'.
5. Use the number keys on the remote control transmitter to enter a new value for the selected option byte. The value must be entered as a three-digit value (for example '4' would be entered as '0 0 4').
6. The selected value must be between '0' and '255'.
7. When all desired changes to the option bytes are made, press the MENU button to return to the top level SDAM menu. This will save changes to the option byte settings.
8. To ensure the option byte changes take effect:
   - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   - Disconnect the television set from AC power for at least ten seconds.
   - Reconnect the television set to AC power.
   - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

Leaving the OPTION submenu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched OFF and ON with the mains switch (cold start).

How to Calculate the Value of an Option Byte
Calculate an Option Byte value (OP 1 .. OP 7) in the following way:
1. Check the status of the single option bits (OB) are they enabled (1) or disabled (0).
2. When an option bit is enabled (1), it represents a certain value (see first column "value between brackets" in table below). When an option bit is disabled, its value is 0.
3. The total value of an Option Byte is formed by the sum of its eight option bits. See second table below for the correct Option Bytes per type number.

Bit (value)	OP1	OP2	OP3	OP4	OP5	OP6	OP7
0 (1)	OB10	OB20	OB30	OB40	OB50	OB60	OB70
1 (2)	OB11	OB21	OB31	OB41	OB51	OB61	OB71
2 (4)	OB12	OB22	OB32	OB42	OB52	OB62	OB72
3 (8)	OB13	OB23	OB33	OB43	OB53	OB63	OB73
4 (16)	OB14	OB24	OB34	OB44	OB54	OB64	OB74
5 (32)	OB15	OB25	OB35	OB45	OB55	OB65	OB75
6 (64)	OB16	OB26	OB36	OB46	OB56	OB66	OB76
7 (128)	OB17	OB27	OB37	OB47	OB57	OB67	OB77
Total	Sum	Sum	Sum	Sum	Sum	Sum	Sum

CL 36530044_077.eps 160803

Figure 8-3 Option Byte calculation

Table 8-2 Options settings

MODEL	OP1	OP2	OP3	OP4	OP5	OP6	OP7
14PT6441/37	65	215	65	162	204	201	0
14RF50S171	65	215	65	162	196	201	0
20PS40S171	65	215	65	162	196	201	0
20PS47S171	65	215	65	162	196	201	0
20PT5441/37	65	215	65	162	204	201	0
20PT633R71	65	215	65	162	192	201	0
20PT6431/37	65	215	65	162	204	201	0
20PT6441/37	65	215	65	162	204	201	0
20PT643R71	65	215	65	162	204	201	0
20MS334R71	65	215	65	2	192	73	0

Option Bit Assignment
Following are the option bit assignments for all L03 software clusters.

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Table 8-3 Option Bit Assignment

Option Byte		Option Bit Definition			
OP #		Assignment	Bit = [0]	Bit = [1]	Default setting
1	OBx0	CHINA or NTSC_ONLY	Tuning is not for China set or NTSC only set, or this option bit is not applicable	Tuning is for China set or NTSC only set	LATAM & NAFTA: 0 for other sets: 1
	OBx1	VIRGIN_MODE	Virgin mode is disabled or not applicable	Virgin mode is enabled. Plug and Play menu item will be displayed to perform installation at the initial startup of the TV when VIRGIN_MODE is set to 1. After installation is finished, this option bit will be automatically set to 0	LATAM & NAFTA: 0
	OBx2	UK_FNP	UK's default Plug and Play setting is not available or not applicable	UK's default Plug and Play setting is available. When UK_FNP and VIRGIN_MODE are set to 1 at the initial setup, LANGUAGE = ENGLISH, COUNTRY = GREAT BRITAIN and after exiting from menu, VIRGIN_MODE will be set automatically to 0 while UK_FNP remains 1	LATAM & NAFTA: 0
	OBx3	ACI	ACI feature is disabled or not applicable	ACI feature is enabled	LATAM & NAFTA: 0
	OBx4	ATS (EU), or FINE_TUNING (NAFTA), or LANGUAGE_MALAY (AP)	Feature is disabled or not applicable	Feature is enabled	LATAM & NAFTA: 0
	OBx5	LNA	Auto Picture Booster is not available or not applicable	Auto Picture Booster is available	LATAM & NAFTA: 0
	OBx6	FM_RADIO	FM radio feature is disabled or not applicable	FM radio feature is enabled	LATAM & NAFTA: 0
	OBx7	PHILIPS_TUNER	ALPS / MASCO compatible tuner is in use	Philips compatible tuner is in use	LATAM & NAFTA: 0
2	OBx0	HUE	Hue/Tint Level is disabled or not applicable	Hue/Tint Level is enabled	LATAM & NAFTA: 1
	OBx1	COLOR_TEMP	Color Temperature is disabled or not applicable	Color Temperature is enabled	LATAM & NAFTA: 1
	OBx2	CONTRAST_PLUS	Contrast+ is disabled or not applicable	Contrast+ is enabled	LATAM & NAFTA: 1
	OBx3	TILT	Rotate Picture is disabled or not applicable	Rotate Picture is enabled	LATAM & NAFTA: 0
	OBx4	NOISE_REDUCTION	Noise Reduction (NR) is disabled or not applicable	Noise Reduction (NR) is enabled	LATAM & NAFTA: 0
	OBx5	CHANNEL_NAMING	Name FM Channel is disabled or not applicable	Name FM Channel is enabled	LATAM & NAFTA: 0 (Note: Name FM channel can be enabled only when FM_RADIO= 1)
	OBx6	SMART_PICTURE	Smart Picture is disabled or not applicable	Smart Picture is enabled	LATAM & NAFTA: 1
	OBx7	SMART_SOUND	Smart Sound is disabled or not applicable	Smart Sound is enabled	LATAM & NAFTA: 0 for mono sets 1 for stereo sets.
3	OBx0	AVL	AVL is disabled or not applicable	AVL is enabled	LATAM & NAFTA: 1
	OBx1	WSSB or HOME_CINEMA	WSSB is disabled or not applicable	WSSB is enabled	LATAM & NAFTA: 0 (Note: This option bit can be set to 1 only when WIDE_SCREEN= 1)
	OBx3	WIDE_SCREEN	Software is used for 4:3 set or not applicable	Software is used for 16:9 set	LATAM & NAFTA: 0
	OBx2	Virtual Dolby			LATAM & NAFTA: 1
	OBx4	MSP34X5_VOL_CTRL			LATAM & NAFTA: 0 (Note: For 2 x 10 W sets only)
	OBx5	COMPRESS_16_9	COMPRESS 16:9 selection is not applicable. Item should not be in the FORMAT menu list	COMPRESS 16:9 selection is applicable. Item should not be in the FORMAT menu list	LATAM & NAFTA: 0
	OBx6	EXPAND_4_3	Expand 4:3 selection is not applicable. Item should not be in the FORMAT menu list.	Expand 4:3 selection is applicable. Item should be in the FORMAT menu list	LATAM & NAFTA: 1
	OBx7	EW_FUNCTION	EW function is disabled. In this case only Expand 4:3 is allowed, Compress 16:9 is not applicable	EW function is enabled. In this case both Expand 4:3 and Compress 16:9 are applicable.	LATAM & NAFTA: 0
4	OBx0	STEREO_NON_DBX	For AP_NTSC, chip TDA 9853 is not present	For AP_NTSC, chip TDA 9853 is present	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets.
	OBx1	STEREO_DBX	For AP_NTSC, chip MSP 3445 is not present	For AP_NTSC, chip MSP 3445 is present	LATAM & NAFTA: 0
	OBx2	STEREO_PB or KOREAN_2CS	For AP_PAL, chip MSP3465 is not present	For AP_PAL, chip MSP3465 is present	LATAM & NAFTA: 0
	OBx3	STEREO_NICAM_2CS	For EU and AP_PAL, chip MSP 3415 is not present	For EU and AP_PAL, chip MSP 3415 is present	LATAM & NAFTA: 0
	OBx4	OB44: DELTA_VOLUME	Delta Volume Level is disabled or not applicable	Delta Volume Level is enabled	
	OBx5	OB45: ULTRA_BASS	Ultra Bass is disabled or not applicable	Ultra Bass is enabled	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets
	OBx6	VOLUME_LIMITER	Volume Limiter Level is disabled or not applicable	Volume Limiter Level is enabled	LATAM & NAFTA: 0
	OBx7	OB47: INCR_SUR	Incredible Surround feature is disabled	Incredible Surround feature is enabled	LATAM & NAFTA: 0 for mono sets, 1 for stereo sets.
5	OBx0	PIP or CLOCK	Feature is disabled or not applicable	Feature is enabled	LATAM & NAFTA: 0
	OBx1	HM	NM is disabled or not applicable	HM is enabled	LATAM & NAFTA: 0 for stereo sets, 1 for mono sets
	OBx2	SVHS	SVHS source is not available	SVHS source is available	LATAM & NAFTA: 0 (Note: This option bit is not applicable for EU)
	OBx3	CVI	CVI source is not available	CVI source is available	
	OBx4	AV3	Side/Front AV3 source is not present	Side/Front AV3 source is present	LATAM & NAFTA: 0.
	OBx5	AV2	AV2 source is not present	AV2 source is present	LATAM & NAFTA: 0 (Note: For EU, when AV2=1, both EXT2 and SVHS2 should be included in the OSD loop)
	OBx6	AV1	AV1 source is not present	AV1 source is present	LATAM & NAFTA: 1
	OBx7	NTSC_PLAYBACK	NTSC playback feature is not available	NTSC playback feature is available	LATAM & NAFTA: 1
6	OBx0	BASS_TREBLE	Feature is not available	Feature is available	LATAM & NAFTA: 0 for mono sets 1 for stereo sets
	OBx1	SMART_TEXT	Smart Text Mode and Favorite Page are disabled or not applicable	Smart Text Mode and Favorite Page are enabled	LATAM & NAFTA: 0
	OBx2	SMART_LOCK	Child Lock and Lock Channel are disabled or not applicable for EU	Child Lock and Lock Channel are enabled for EU	LATAM & NAFTA: 1
	OBx2	VCHIP (LATAM & NAFTA & NAFTA) / TXT_1PG (EU)	Feature is disabled	Feature is enabled	LATAM & NAFTA: 0.
	OBx4	WAKEUP_CLOCK	Wake up clock feature is disabled or not applicable	Wake up clock feature is enabled	LATAM & NAFTA: 0
	OBx5	SMART_CLOCK	Smart Clock Using Teletext and Smart Clock Using PBS is disabled or not applicable	Smart Clock Using Teletext and Smart Clock Using PBS is enabled. For NAFTA, menu item AUTOCHRON is present in the INSTALL submenu	LATAM & NAFTA: 0
	OBx6	SMART_SURF	Smart Surf feature is disabled or not applicable	Smart Surf andure is enabled	LATAM & NAFTA: 1
	OBx7	PERSONAL_ZAPPING	Personal Zapping feature is disabled or not applicable	Personal Zapping feature is enabled	LATAM & NAFTA: 0
7	OBx0	SYSTEM_LT_1 and SYSTEM_LT_2	These two option bits are allocated for LATAM system selection. (00: NTSC-M, 01: NTSC-M, PAL-M,, 10: NTSC-M, PAL-M, and PAL-N, 11: NTSC-M, PAL-M, PAL-N, and PAL-BG)		
	OBx1				
	OBx2	SOUND_SYSTEM_AP	OB70 OB71 OB72: These three option bits are allocated for AP_PAL sound system selection. (000: BG, 001: BG / DK, 010: I / DK, 011: BG / I / DK, 100: BG / I / DK / M)		
	OBx3	COLOR_SYSTEM_AP (This option bit is allocated for AP-PAL color system selection)	Auto, PAL 4.43, NTSC 4.43, and NTSC 3.58	Auto, PAL 4.43, NTSC 4.43, NTSC 3.58, and SECAM	LATAM & NAFTA: 0
	OBx4	SIGNAL_STRENGTH / DVD WAKEUP TIMER (DVD COMBI), 3D_COMBFILTER (NAFTA)			LATAM & NAFTA: 1
	OBx5	LNA_PP (for L01 AP cluster), VOICE_CONTROL			LATAM & NAFTA: 0
	OBx6	ACTIVE_CONTROL			LATAM & NAFTA: 1
	OBx7	TIME_WIN1	The time window is set to 1.2 s	The time window is set to 2 s	LATAM & NAFTA: 0 (Note: The time out for all digit entries depends on this setting)

8.3.2 TUNER

Note: Described alignments are only necessary when the NVM (part reference number 7641) is replaced

IFPLL

This adjustment is auto-aligned. Therefore, no action is required (default= "30").

AGC (AGC take over point)

1. Connect the RF output of a video pattern generator to the antenna input
2. Input a color bar test pattern to the television set
3. Set the amplitude of the video pattern generator to 10 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
4. Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main chassis).
5. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence)
6. Use the MENU UP/DOWN keys to highlight the TUNER sub menu
7. Press the MENU LEFT/RIGHT keys to enter the TUNER sub menu
8. Use the MENU UP/DOWN keys to select AGC
9. Use the MENU LEFT/RIGHT keys to adjust the AGC value (default value is "32") until the DC-voltage at pin 1 of the tuner lies is 3.3 V
10. Press the MENU button to return to the top level SDAM menu
11. To ensure the AGC change takes effect
    - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard
    - Disconnect the television set from AC power for at least ten seconds

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- Reconnect the television set to AC power
- Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard

SL (Slicing Level)
This adjustment sets the sync slicing level for non-standard signals. You must turn it 'on' to have no picture instability in premium decoded cable channels.
- OFF: slicing level dependent on noise level
- ON: fixed slicing level of 70 %.

To adjust SL:
1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the TUNER sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the TUNER sub menu.
4. Use the MENU UP/DOWN keys to select SL.
5. Use the MENU LEFT/RIGHT keys to toggle SL 'Off' and 'On'.
6. Press the MENU button to return to the top level SDAM menu.
7. To ensure the SL setting is saved:
   - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   - Disconnect the television set from AC power for at least ten seconds.
   - Reconnect the television set to AC power.
   - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

CL (Cathode Drive Level)
Fixed value is "7".

8.3.3 WHITE TONE

The values of the 'black cut-off level' can be adjusted in the 'WHITE TONE' sub menu.
Normally, no alignment is needed for 'WHITE TONE', and the given default values are used.

Default settings for **NORMAL** (color temperature= 11500 K):
NORMAL RED = 22
NORMAL GREEN = 21
NORMAL BLUE = 26

To adjust NORMAL RED, NORMAL GREEN, and NORMAL BLUE:
1. Connect the RF output of a video pattern generator (e.g. PM5416) to the antenna input.
2. Set the amplitude of the video pattern generator to at least 1 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
3. Input a "100 IRE white" pattern to the television set.
4. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
5. Use the MENU UP/DOWN keys to highlight the WHITE TONE sub menu.
6. Press the MENU LEFT/RIGHT keys to enter the WHITE TONE sub menu.
7. Use the MENU UP/DOWN keys to select NORMAL RED, NORMAL GREEN, or NORMAL BLUE.
8. Set the Minolta CA100 color analyzer (or equivalent) in RGB mode, and set all color temperature settings to their default values.
9. Place the color sensor of the meter in the middle of the screen.
10. Set the meter in "T-dUV-Y" mode, and set CONTRAST to make the light output "Y" on the meter 90 nit ± 15%.
11. Use the MENU LEFT/RIGHT keys to adjust the value of NORMAL GREEN and/or NORMAL BLUE.
12. When all desired changes to the WHITE TONE sub menu values are made, press the MENU button to return to the top level SDAM menu.
13. To ensure the WHITE TONE settings are saved:
    - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
    - Disconnect the television set from AC power for at least ten seconds.
    - Reconnect the television set to AC power.
    - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

8.3.4 GEOMETRY

Introduction
The geometry alignment menu contains several items for correct picture geometry alignment.

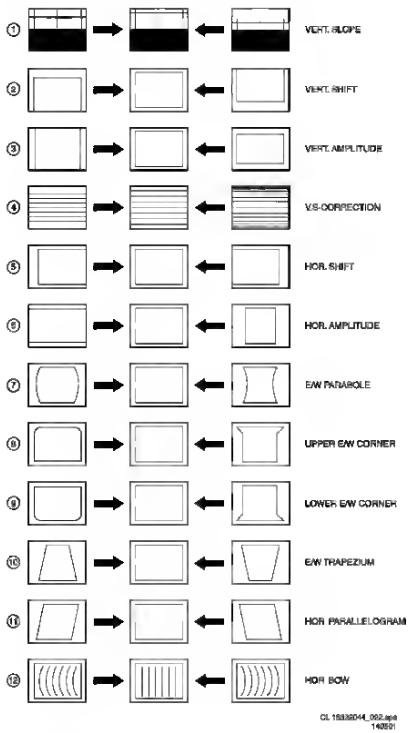

Figure 8-4 Geometry alignments

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a crosshatch test pattern to the television set.
3. Set the amplitude of the video pattern generator to at least 1 mV and set the frequency to 475.25 MHz (PAL/SECAM) or 61.25 MHz (NTSC).
4. Press the SMART PICTURE button on the remote control transmitter repeatedly to choose PERSONAL or MOVIES picture mode.
5. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
6. Use the MENU UP/DOWN keys to highlight the GEOMETRY sub menu.
7. Press the MENU LEFT/RIGHT keys to enter the GEOMETRY sub menu.
8. Use the MENU UP/DOWN keys to highlight either the HORIZONTAL sub menu or the VERTICAL sub menu.
9. Press the MENU LEFT/RIGHT keys to enter either the HORIZONTAL sub menu or the VERTICAL sub menu.
10. Use the MENU UP/DOWN keys to select items in the HORIZONTAL sub menu or the VERTICAL sub menu.
11. Use the MENU LEFT/RIGHT keys to adjust the values of items in the HORIZONTAL and VERTICAL sub menus.
12. When all desired changes to the HORIZONTAL and VERTICAL sub menu values are made, press the MENU button twice to return to the top level SDAM menu.
13. To ensure the GEOMETRY settings are saved:
    - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
    - Disconnect the television set from AC power for at least ten seconds.
    - Reconnect the television set to AC power.
    - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

The following alignments can be performed in the GEOMETRY sub menu:

Horizontal Alignments:
- Horizontal Shift (HSH): Select Horizontal Shift to center the picture on the screen.
- Picture Width (PW): Aligns the width of the picture.

Vertical Alignments:
- Vertical slope (VSL): Aligns the picture so the proportions are the same at the top and bottom of the screen. This alignment must be performed first, before all other vertical alignments. Turning SBL 'on' will assist in performing this alignment.
- Vertical Amplitude (VAM): Aligns the height of the picture (other vertical alignments are NOT compensated).
- Vertical S-Correction (VSC): Aligns the vertical linearity, so that the vertical intervals of the grid-patterns are the same over the entire height of the screen.
- Vertical Shift (VSH): Aligns the vertical center of the picture to the vertical center of the CRT. After performing this alignment, it may be necessary to perform the VAM alignment again.
- Service blanking (SBL): Turns the blanking of the lower half of the screen 'on' or 'off' (to be used in combination with the vertical slope alignment).

Methods of Adjustment
Vertical Amplitude and Position
1. Select SERVICE BLANKING (SBL) and set it to 1. The lower half of the picture will be blanked.
2. Press the MENU UP/DOWN buttons to select VERTICAL SLOPE (VSL).
3. Align VSL to start the blanking exactly at the horizontal white line at the center of the test circle (align the bottom of the screen so that castellations just disappear).
4. Press the MENU UP/DOWN buttons to select SBL and set it back to 0. The full picture reappears.
5. Select VERTICAL AMPLITUDE (VAM) and align the picture height to approximately 13.0 - 13.1 blocks (align the top of the screen so that castellations just disappear).
6. Select VERTICAL SHIFT (VSH) and align for vertical centering of the picture on the screen.
7. Repeat the last two steps if necessary.

Horizontal Phase
1. Set PW to "0".
2. Select Horizontal Shift (HSH) to center the picture on the screen.

Horizontal and Vertical Shift Offset for NTSC (TRINOMA and PAL chassis)
1. Align the set for VSH and HSH (according to above mentioned procedures) with a PAL system signal.
2. Change the signal to NTSC system and adjust HORIZONTAL SHIFT OFFSET (H60) and VERTICAL SHIFT OFFSET (V60) to center the picture on the screen.
3. Repeat if necessary.

The table below lists the default GEOMETRY values for the different television sets.

Table 8-4 Default geometry values

Alignment	Description	Value
PW 31	Picture Width	1F
HSH	Horizontal Shift	35
VSL	Vertical Slope	33
VAM	Vertical Amplitude	26
VSC	Vertical S orrection	23
VSH	Vertical Shift	31

8.3.5 AUDIO

Necessary measuring equipment:
- MTS (Multi-channel Television Sound) generator (e.g. Fluke 54200).
- AC millivolt meter.

ILA (Input Level Alignment)
1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select ILA.
5. Apply a BTSC sound signal with a signal strength of 60 dBuV (1 mV_rms) to the aerial input. Measure the output on pin 21 (L_OUT) of IC7841 with an AC millivoltmeter via a **Low Pass Filter** (R= 10 kohm, C= 1.5 nF, measure on the capacitor).
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to 106 mV_rms ± 2 mV_rms (default ILA value is "31").
7. Press the MENU button to return to the top level SDAM menu.
6. To ensure the ILA setting is saved:
   - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   - Disconnect the television set from AC power for at least ten seconds.
   - Reconnect the television set to AC power.
   - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

LSA (Low Separation Alignment)
1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed

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by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select LSA.
5. Apply a 300 Hz BTSC sound signal with a signal strength of 60 dBuV (1 mV_rms) to the aerial input (only the left channel of the stereo signal). Measure the output on pin 22 (R_OUT) of IC7841 with an AC millivoltmeter.
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to a minimum value (default LSA value is "7" for stereo sets, and "0" for mono sets).
7. Press the MENU button to return to the top level SDAM menu.
8. To ensure the LSA setting is saved:
   - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   - Disconnect the television set from AC power for at least ten seconds.
   - Reconnect the television set to AC power.
   - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

HSA (High Separation Alignment)

1. Activate SDAM by pressing the following key sequence on the remote control transmitter: 0 6 2 5 9 6 directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select HSA.
5. Apply a 3 kHz BTSC sound signal with a signal strength of 60 dBuV (1 mV_rms) to the aerial input (only the left channel of the stereo signal). Measure the output on pin 22 (R_OUT) of IC7841 with an AC millivoltmeter.
6. Use the MENU LEFT/RIGHT keys to adjust the meter reading to a minimum value (default HSA value is "31").
7. Press the MENU button to return to the top level SDAM menu.
8. To ensure the HSA setting is saved:
   - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
   - Disconnect the television set from AC power for at least ten seconds.
   - Reconnect the television set to AC power.
   - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard

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Service Modes

Service Default Alignment Mode (SDAM) offers several features for the service technician.

There is also the option of using ComPair, a hardware interface between a computer (see requirements) and the TV chassis. It offers the ability of structured trouble shooting, error code reading and software version readout for all chassis. Requirements: To run ComPair on a computer (laptop or desktop) requires, as a minimum, a 486 processor, Windows 3.1 and a CD-ROM drive. A Pentium Processor and Windows 95/98 are however preferred (see also paragraph 5.4).

Table 5-2 SW Cluster

SW Cluster	Software mane	UOC type	UOC Diversity	Special Features
L3SUS1	L03US1 x.y	TDA9377	55K ROM Size	Stereo
L3SUS2	L03US2 x.y	TDA9377	55K ROM Size	Magnavox Stereo
Abbreviations in Software name. U = Nefta, S = Stereo.				

Service Default Alignment Mode (SDAM)

Purpose

- To change option settings.
- To create a predefined setting to get the same measurement results as given in this manual.
- To display / clear the error code buffer.
- To override SW protections.
- To perform alignments.
- To start the blinking LED procedure.

Specifications

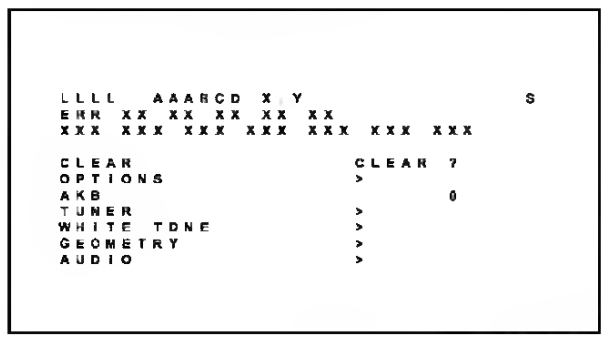
- Tuning frequency: 61.25 MHz (channel 3) for NTSC-sets (Nafta).
- Color system: NTSC-M.
- All picture settings at 50 % (brightness, color contrast, hue).
- Bass, treble end balance et 50 %; volume et 25 %.
- All service-unfriendly modes (if present) are disabled, like:
  - (Sleep) timer,
  - Child/parantal lock,
  - Blue mute,
  - Hotel/hospitality mode
  - Auto switch-off (when no "IDENT" video signal is received for 15 minutes),
  - Skip / blank of non-favorite presets / channels,
  - Auto store of personal presets,
  - Auto user menu time-out.
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to enter SDAM

Use one of the following methods.

- Use a standard customer RC-transmitter and key in the code 062596 directly followed by the "M" (menu) button or
- Short jumper wires 9257 and pin 4 of 7200 on the mono carrier (see Fig. 8-1) and apply AC power. Then press the power button (remove the short after start-up).
- Caution: Entering SDAM by shorten wires 9257 and pin 4 of 7200 will override the +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could leed to demaging the set.
- Or via ComPair.

After entering SDAM, the following screen is visible, with S at the upper right side for recognition.



CL 36532044_033.eps 130603

Figure 5-1 SDAM Menu

- **LLLL.** This is the operation hours counter. It counts the normal operation hours, not the standby hours.

- **AAABCD-X.Y.** This is the software identification of the main micro controllar:
  - A = the project name (L03).
  - B = the region: E= Europe, A= Asie Pacific, U= NAFTA, L= LATAM.
  - C = the feature of software diversity: N = stereo non-DBX, S = stereo dBx, M = mono, D = DVD
  - D = the language cluster number:
  - X = the main software version number.
  - Y = the sub software version number.
- **S.** Indication of the actual mode. S= SDAM= Service Default Alignment mode.
- **Error buffers.** Five errors possible.
- **Option bytes.** Seven codes possible.
- **Clear.** Erase the contents of the error buffer. Select the CLEAR menu item and press the CURSOR RIGHT key. The content of the error buffer is cleared.
- **Options.** To set the Option Bytes. See chapter 8.3.1 for a detailed description.
- **AKB.** Disabla (0) or anable (1) the "black current loop" (AKB = Auto Kine Bias).
- **Tuner.** To align the Tuner. See chapter 8.3.2 for a detailed description.
- **White Tone.** To align the White Tone. See chaptar 8 3.3 for a detailed description.
- **Geometry.** To align the set geometry. See chapter 8.3.4 for e detailed description.
- **Audio. Use default value (Stereo set only),** align when necessary. See chapter 8 3.x for a detailed description.

<<<<<<<

How to navigate

- In SDAM, select menu items with the CURSOR UP/DOWN key on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move tha CURSOR UP/DOWN key to display tha next / previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- When you press the MENU button twice, the set will switch to the normel user menus (with the SDAM mode still active in the background). To return to the SDAM menu press the OSD / STATUS button.
- When you press the MENU key in a submenu, you will return to the previous menu.

How to store settings

To store settings, leave the SDAM mode with the Standby button on the remote.

How to exit

Switch the set to STANDBY by pressing the power button on the remote control (if you switch the set 'off' by removing the AC power, the set will return in SDAM when AC power is re-applied). The error buffer is **not** cleared.

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Rev. Date: 05-18-2005
Print Date: 1/20/2006

Training Information

REFER TO SAFETY GUIDELINES

SAFETY NOTICE: ANY PERSON ATTEMPTING TO SERVICE THIS CHASSIS MUST FAMILIARIZE HIMSELF WITH THE CHASSIS AND BE AWARE OF THE NECESSARY SAFETY PRECAUTIONS TO BE USED WHEN SERVICING ELECTRONIC EQUIPMENT CONTAINING HIGH VOLTAGES.

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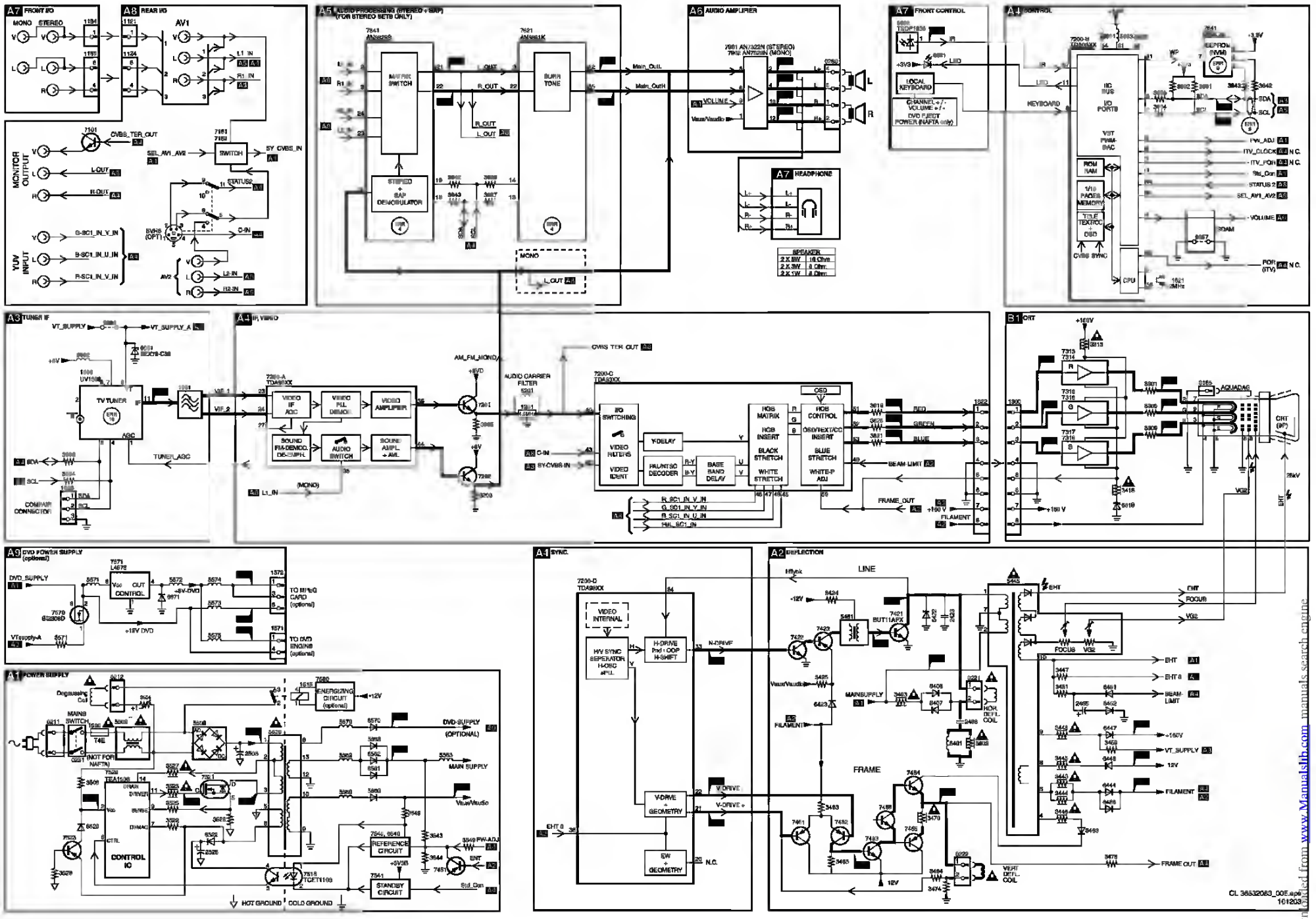
Block Diagram



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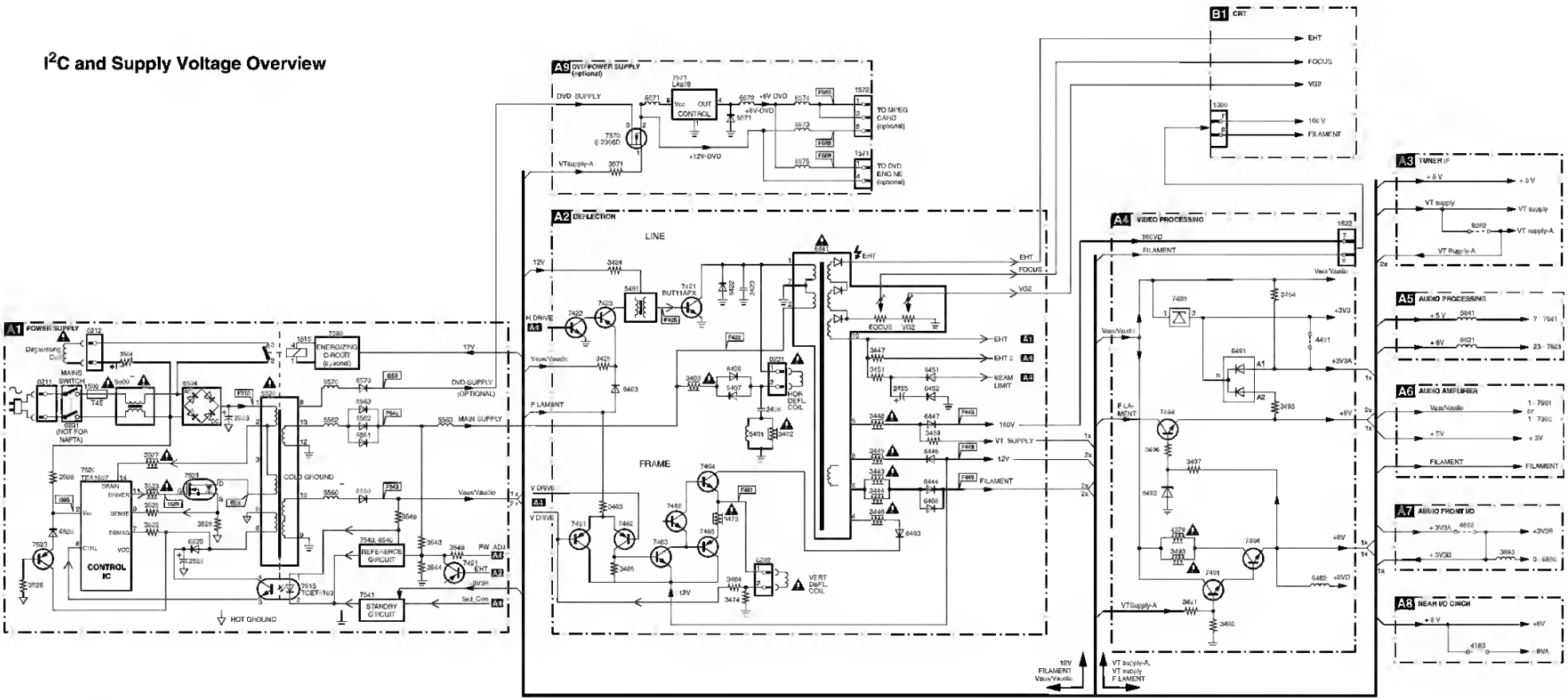
I²C and Supply Voltage Overview



ERROR CODE LIST

Error	Device	Error description	Check item	Diagram
0	Not applicable	No Error		
1	Not applicable	X-Ray Protection (USA)	-	-
2	Not applicable	Horizontal Protection	7421, 7422, 7423	A2
3	Not applicable	Vertical Protection	7461, 7462, 7463, 7464, 7465, 7466	A2
4	AN5691K & AN5625S	Tone control & Audio processor I2C identification error	7621 (tone IC), 7541 (Stereo/Sap)	A5
5	TDA93XX	POR 3.3V / 8V Protection	7200, 7541, 7491, 7493, 7496	A4, A1
6	I2C bus	General I2C bus error	7200, 3604, 3605	A4
7	Not applicable			
8	Not applicable	E/W Protection (Large Screens)		
9	M24C16	NVM I2C identification error	7641, 3641, 3642, 3643	A4
10	Tuner	Tuner I2C identification error	1000, 3003, 3004	A3
11	Not applicable	Black current loop protection	3313, 7307, 7308, 7309, 7310, 7311, 7312, 7313, 7314, 7315, 7316, 7317, 7315, CRT	B1
12	Not applicable	MAP I2C identification error (USA)		
13	Not applicable	VC I2C identification error (Eu)	-	-
14	Not applicable	DVD I2C identification error	-	-

I2C BUS INTERCONNECTION DIAGRAM

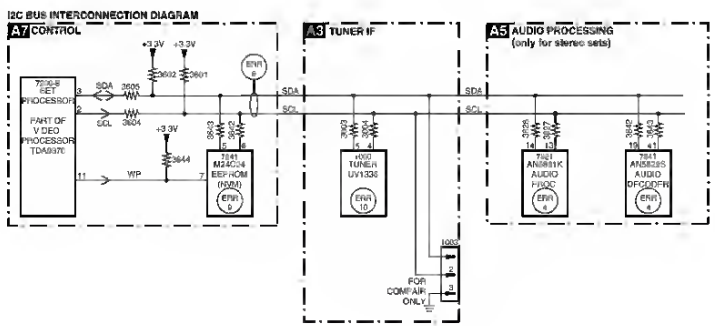


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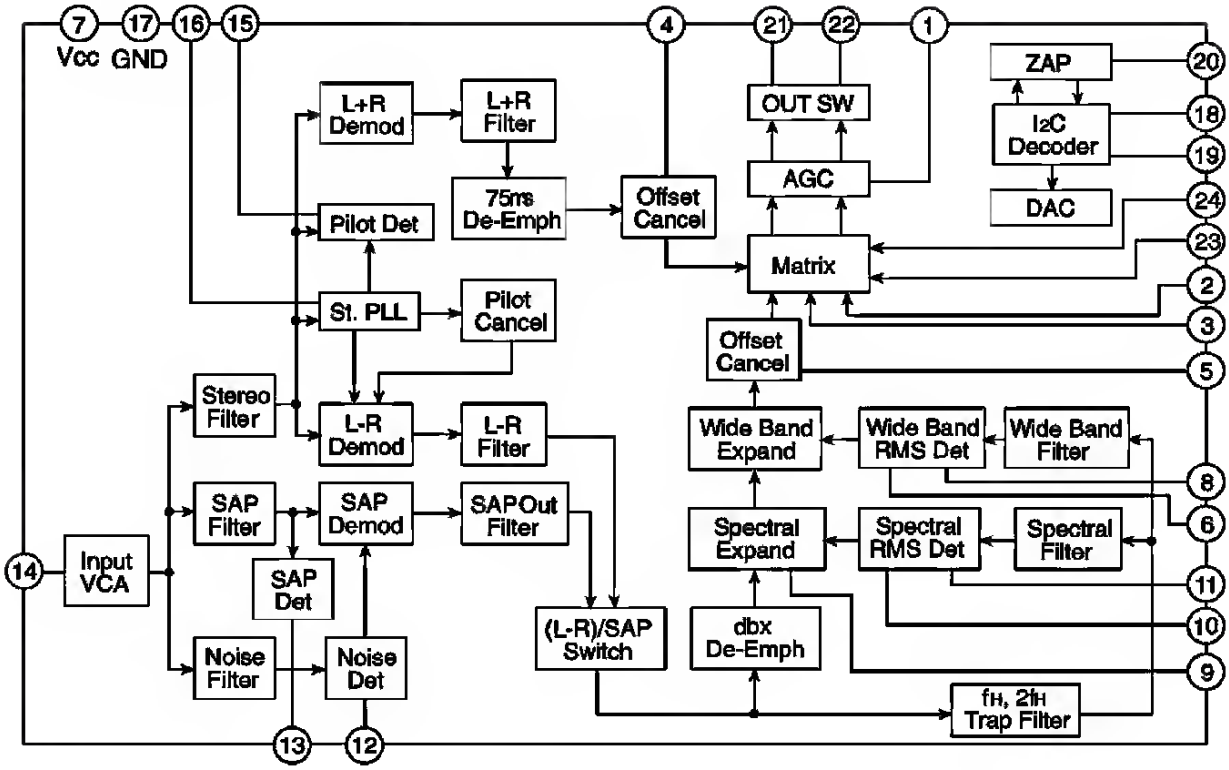
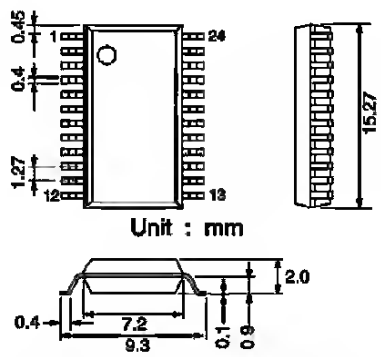
Diagram A5, AN5829S (IC7841)

Block Diagram





24-Lead PANAFLAT Package (SO-24D)

Test Circuit

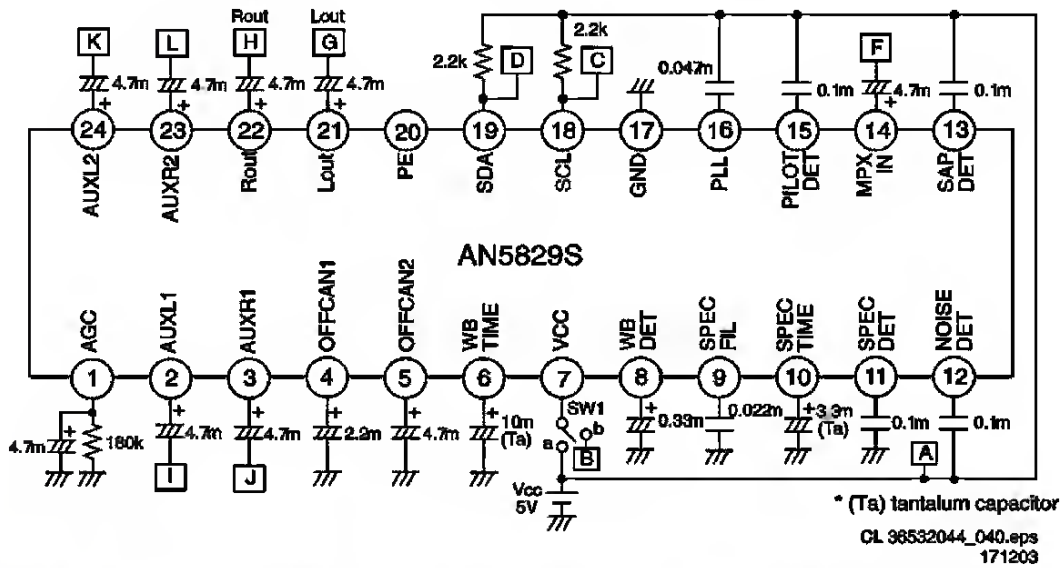


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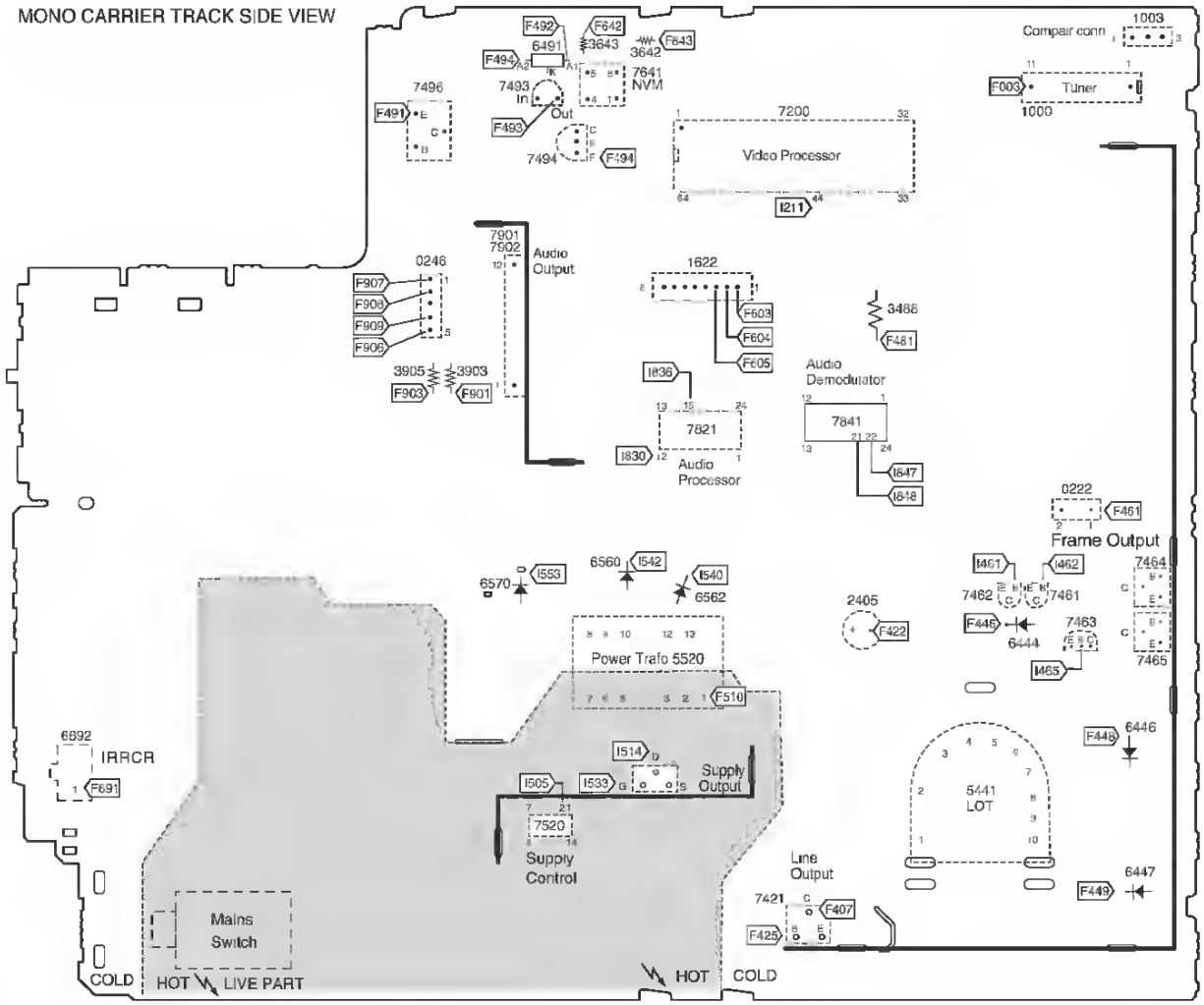
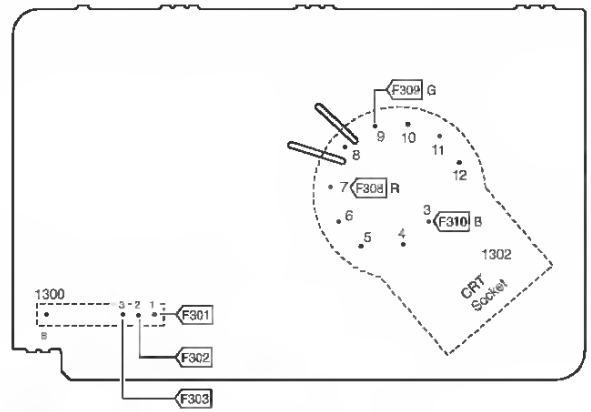
Figure 9-5 Internal Block Diagram and Pin Configuration

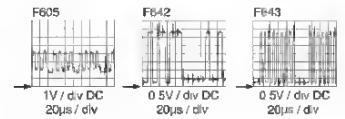
Testpoint Overview Mono Carrier and CRT Panel

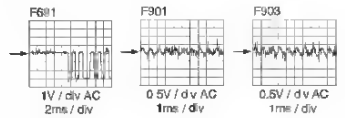
MONO CARRIER TRACK SIDE VIEW

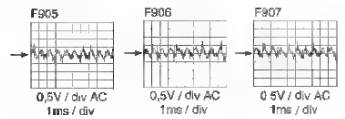


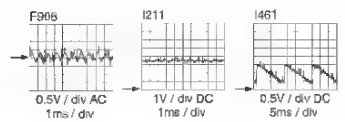
CRT TRACK SIDE VIEW

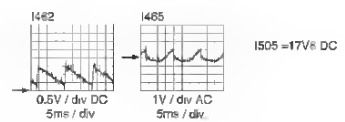




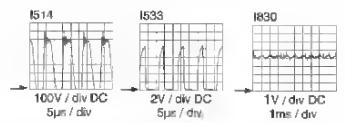


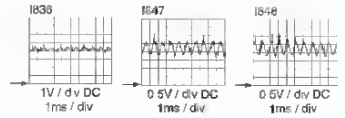


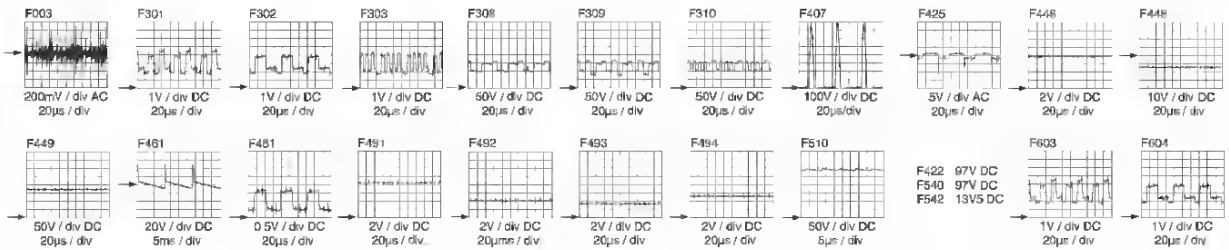




I505 =17V8 DC







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Introduction

The "L03"' chassis is a global TV chassis for the model year 2003 and is used for TV sets with screen sizes from 14 inch to 21 inch, in Super Flat and Real Flat executions. In comparison to its predecessor (the "L01"), this chassis is further simplified: it contains economized executions of the power supply, the video processing (microprocessor), and the audio processing.

The standard architecture consists of a Main panel (called "family board"), a Picture Tube panel, a Side I/O panel, and a Top Control panel. The Main panel consists primarily of conventional components with some surface mounted devices in the audio and video processing part.

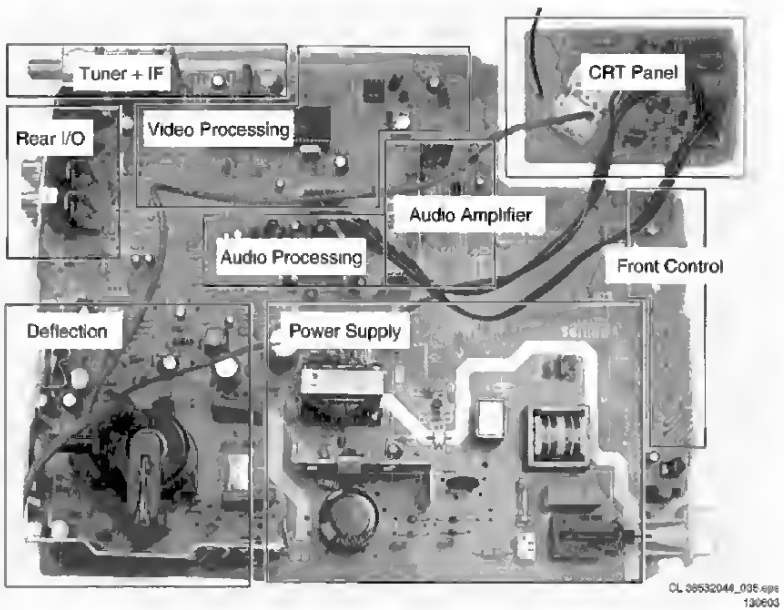

Figure 9-1 Top view family board

The functions for video processing, microprocessor (P), and CC/Teletext (TXT) decoder are combined in one IC (TDA937x), the so-called Ultimate One Chip (UOC). This chip is mounted on the component side of the main panel.

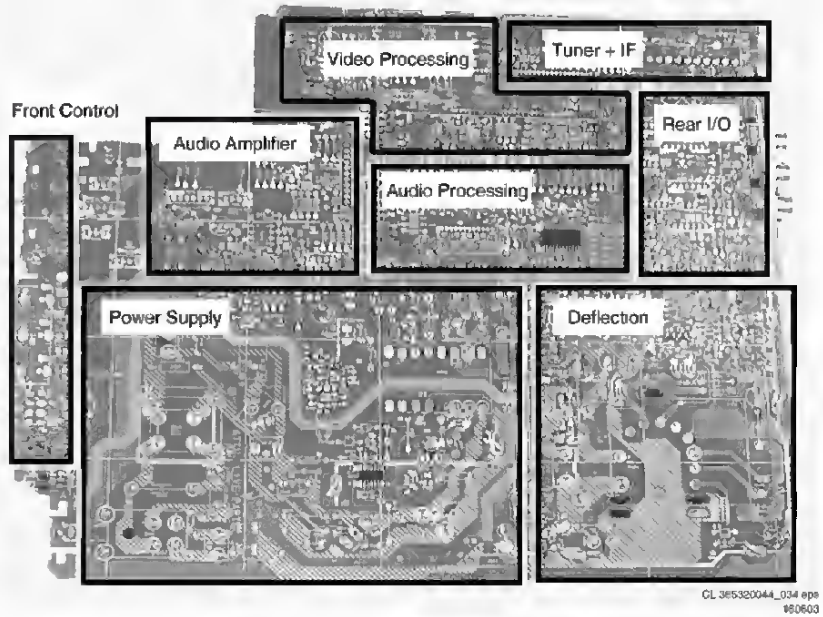

Figure 9-2 Bottom view family board

The L03 can be divided into two basic systems, i.e. mono and stereo sound. While the audio processing for the mono sound is done in the audio block of the UOC, external audio processing ICs are used for stereo sets.

The tuning system features 181 channels with on-screen display. The main tuning system uses a tuner, a microcomputer, and a memory IC mounted on the main panel. The microcomputer communicates with the memory IC, the customer keyboard, remote receiver, tuner, signal processor IC and the audio output IC via the I2C bus. The memory IC retains the settings for favorite stations, customer-preferred settings, and service / factory data.
The on-screen graphics and closed caption decoding are done within the microprocessor where they are added to the main signal.

The chassis uses a Switching Mode Power Supply (SMPS) for the main voltage source. The chassis has a 'hot' ground reference on the primary side and a cold ground reference on the secondary side of the power supply and the rest of the chassis.

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Source Selection

The Source Select is divided mainly into two types, the "Mono Source Select" and the "Stereo Source Select".

- The Mono Source Select, both audio and video, will be done entirely by the UOC and will only be able to select one external audio source.
- As for the Stereo Source Select, the Panasonic IC, which is for BTSC decoding also, has 2 audio source inputs used for source selection, whereas the UOC will take care of the video selection.

Switching Function for Stereo I/O

Video Source Selection

The video source selection is done by the UOC. The video setting for LATAM / NAFTA is rather straightforward: a so-called "WYSIWYG" (what you see on the screen, is what you get from the video ouput).

Audio Source Selection

The AN5829 (BTSC decoder) device does the external stereo audio source selection. A maximum of three audio input sources can be selected. AV1 or FRONT is selected by the mechanical switch in the front cinch connector.
The selected external audio source is then fed to the AN5829 AUX1 input (pins 2 and 3). The AV2 is fed directly to AN5829 via AUX2 (pins 23 and 24). Then via I2C, the AN5829 IC source selection can be done.

Switching Function for Mono I/O

For the Mono configuration, only one input pin is available for the UOC.

Video Source Selection

The video switching is similar to the section above.

Audio Source Selection

The audio input (L1_IN) is connected to pin 35 of the UOC.

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9.3 Audio

This chassis is targeted for the NAFTA market with Mono, Stereo, or SAP sound system.
For the "basic" Mono and Stereo sets, sound processing includes Volume control and AVL.
For stereo sets, IC AN5829S is the BTSC audio signal decoder and AN5891K is the audio processing IC.

9.3.1 Processing

This chassis uses the Intercarrier demodulation concept (one SAW filter for both video and audio). The base band (full bandwidth) BTSC audio signal from the UOC is fed to pin 14 of the stereo decoder. The Pilot detection and SAP detection registers indicate the type of transmitted audio signal such as Mono, Stereo, and/or SAP. Based on this indication, the software controls will help to output the appropriate audio signal at pins 21 and 22. The controls are done by the I2C bus connected to pins 18 and 19.
Internal or External audio (pins 2, 3, 23, and 24) can also be selected by the source selection register. For the selected audio source, the AGC function can be applied. The output is a fixed level output. The volume control function is available via the power amplifier (AN7522/23).

The selected audio output from IC7841 (AN5829) is fed to pins 3 and 22 of IC7821 (AN5891) for audio processing functions, such as Treble, Bass, Volume, Balance, and Surround sound functions. L_out and R_out are then available on pins 12 and 15.
IC7821 is also I2C controllable (pins 13 and 14). An AVL function is also available in this IC, and can be used for sets using this IC. In this case, the AVL function of the AN5829 is disabled. Subwoofer output (optional) is available on pin 20.

9.3.2 Amplifier

The output is fed to the audio amplifier (IC7901 for stereo sets or IC7902 for mono sets). This is a BTL amplifier (Bridge Tied Load), which is actually a class AB amplifier with four transistors for each channel. The advantage of BTL over the standard Class AB amplifier is that it requires a lower supply voltage to deliver a higher output.
The volume level is controlled at this IC (pin 9) by the "VOLUME" control line coming from the microprocessor. After amplification, the audio signal is send to the speaker / headphone output connector.

9.3.3 AVL (Automatic Volume Limiting)

The "Mono AVL" function operates via the UOC. During channel change and source selection, the AVL bit is to be switched "off" and then can resume to the previous state ("on/off") as shown in the timing diagram below.

The "Stereo AVL" function operates via the AGC control of IC AN5829S. During channel change and source selection, the AGC function is to be switched "off" and then can resume to the previous state ("on/off") as shown in timing diagram below.

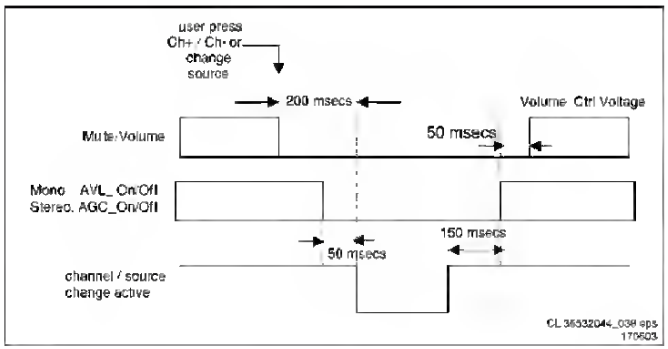

Figure 9-3 AVL timing diagram

9.3.4 Mute

The TV set must mute:

- Whenever a "User Mute" is activated.
- Whenever there is a channel change, RF to RF, RF to AV, AV to RF, and AV to AV (if any). In channel change, MUTE must be activated first before any other activity and un-MUTE must be done after every other activity has been completed.
- Whenever there is a loss in the signal.
- During cold or warm start, MUTE must be activated until all initialization processes are finished.
- When the set is going to STANDBY, MUTE must be activated first before any other activities.

Note:

1. MUTE mentioned above applies for the audio amplifier mute (= PWM volume control mute).
2. The first condition does not apply for the UOC, IC AN5891K, or IC AN5829S.
3. Above conditions refers to both mono and stereo sets

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9.4 Video

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

This chassis uses the TDA937x family Ultimate One Chip TV processor (UOC), which is mounted in an SDIP 64 envelope. The various versions of the UOC series combine the function of a video processor together with a microcontroller and US Closed Caption/TXT decoder.

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9.5 Synchronization

Inside IC7200 (part D) the vertical and horizontal sync pulses are separated. These "H" and "V" signals are synchronized with the incoming CVBS signal. They are then fed to the H- and V-drive circuits and to the OSD/TXT circuit for synchronization of the On Screen Display and Teletext (CC) information.

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9.6 Deflection

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

The L03 range consists of TV sets spanning from 14 to 21 inch using the same chassis architecture. For the chassis architecture, the CRTs used do not need East/West Correction. Therefore the geometry correction needed is horizontal shift, vertical slope, vertical amplitude, vertical S-correction, vertical shift and vertical zoom for geometry corrections (with the appropriate offsets required for NTSC channels on PAL sets).

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9.7 Power Supply

For a detailed circuit description of this part, we refer to the L01.2L AA manual (see the beginning of this chapter for the ordering codes). Please note that there can be minor differences in the text (e.g. other item numbers), but the described circuit principle is comparable.

9.7.1 Introduction

The supply is a Switching Mode Power Supply (SMPS). The frequency of operation varies with the circuit load. This 'Quasi-Resonant Flyback' behavior has some important benefits compared to a 'hard switching' fixed frequency Flyback converter. The efficiency can be improved up to 90%, which results in lower power consumption. Moreover, the supply runs cooler and safety is enhanced.
The control IC in this power supply is the TEA1506 (L01= TEA1507). Unlike the TEA1507 control IC, the TEA1506 has no internal high voltage start-up source, and therefore needs to be started by means of an external bleeder resistor (R3506 and R3507). The operating voltage for the driver circuit is also taken from the 'hot' side of this transformer.
The switching regulator IC 7520 starts switching the FET 'on' and 'off', to control the current flow through the primary winding of transformer 5520. The energy stored in the primary winding during the 'on' time is delivered to the secondary windings during the 'off' time.
The "MainSupply" line is the reference voltage for the power supply. It is sampled by resistors 3543 and 3544 and fed to the input of the regulator 7540 / 6540. This regulator drives the feedback optocoupler 7515 to set the feedback control voltage on pin 6 of 7520.
The power supply in the set is "on" any time AC power is connected to the set.

9.7.2 Derived Voltages

The voltages supplied by the secondary windings of T5520 are:

- "MainSupply" for the horizontal output.
- "V_aux/V_audio" for the audio circuit.
- An optional "DVD_Supply" for future extensions.

Other voltages are provided by the LOT. It supplies -12 V, the tuner voltage, the filament voltage, and the +160 V source for the video drive. These secondary voltages of the LOT are monitored by the "EHT" lines.

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9.8 Control

The microprocessor part of the UOC has the complete control and CC/Teletext processing on board. The User menu's and Service Default / Alignment Mode's are generated by the uP. Communication to other ICs is done via the I2C-bus.

9.8.1 I2C-Bus

The main control system, which consists of the microprocessor part of the UOC (7200), is linked to the external devices (Tuner, NVM, Audio ICs, etc) by means of the I2C-bus. An internal I2C-bus is used to control other signal processing functions, like video processing, sound IF, vision IF, synchronization, etc.

9.8.2 User Interface

The chassis uses a remote control with RC5 protocol. The incoming signal is connected to pin 67 of the UOC.
The keyboard, connected to UOC pin 8, can also control the set. Button recognition is done via a voltage divider.
The front LED (6691) is connected to an output control line of the microprocessor (pin 11). It is activated to provide the user information about whether or not the set is working correctly (e.g., responding to the remote control, normal operation (USA only) or fault condition)

9.8.3 I/O Selection

For the control of the input and output selections, there are three lines:

STATUS1
This signal provides information to the microprocessor on whether a video signal is available on the SCART1 AV input and output port (only for Europe). This signal is not connected in LATAM/NAFTA sets

STATUS2
This signal provides information to the microprocessor on whether a video signal is available on the SCART2 AV input and output port (only for Europe).
For sets with an SVHS input it provides the additional information if a Y/C or CVBS source is present.
The presence of an external Y/C source makes this line 'high' while a CVBS source makes the line 'low'.

SEL_AV1_AV2
This is the source select control signal from the microprocessor. This control line is under user control or can be activated by the other two control lines.

9.8.4 Power Supply Control

The Power Supply is interfaced with the microcontroller (UOC) to provide the power supply with the control signals required for burst mode operation in standby and to vary the picture width by adjusting V_BAT.
The microprocessor part is supplied with 3.3 V and 8 V. The 3.3 V is derived from the 'V_aux/V_audio' voltage via a 3V3 stabilizer (7493). The 8 V is derived from the 33V tuner voltage via TS7491 and TS7496.
Two signals are used to control the power supply: STD_CON and PW_ADJ

STD_CON
This signal is generated by the microprocessor when over-current takes place at the 'Mein' line. This is done to enable the power supply into stendby burst mode, end to eneble this mode during e protection.
This is of logic "high" (3 3 V) under normal operation of the TV. When the TV set is in Standby (or fault) condition, this signal is a continuous pulse of 5 ms "low" (0 V) and 5 ms "high".
Note: In the L01 chassis this was inverted.

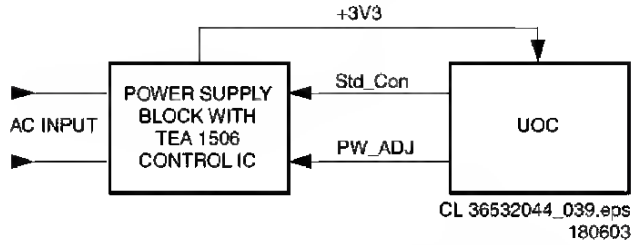

Figure 9-4 Block diagram of power supply interface with UOC

PW_ADJ
This signal is generated by the UOC through a PWM port. This PWM port is configured in Push Pull mode to generate a square wave signal of 0 to 100% duty cycle with a defeult value of 50% duty cycle.
PW_ADJ will eliminate tolerance and cen adjust the picture wide slightly.

9.8.5 Protection Events

Several protection events are controlled by the UOC. In case one of these protections is activated, the set will go to "Standby" mode.

Deflection protections
The main protections for deflection are X-ray protection, frame amplifier failure detection, black current loop stability protection, and +8V auxiliary supply protection. For X-ray protection, the X-ray detection bit, XDT, must always be set to "1" (detection mode). High EHT protection must be triggered vie software upon detection of the XPR bit switching to "1".
A suitable number of checks are done before putting the set into protection mode in order to prevent false triggering.
For service requirements, the Enable Vertical Guard (RGB blanking), EVG, can be disabled (set to "0") although this is not necessary.

The following bits are monitored:
- SUP (Supply voltage indication)
- XPR (X-ray protection)
- EVG (Enable Vertical Guard)
- NDF (Output Vertical Guard)
- BCF (Black Current Failure)

I2C protection
To check whether all I2C IC's are functioning.

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9.9 Abbreviation list

2CS	2 Carrier (or Channel) Stereo
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AFT	Automatic Fine Tuning
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ATS	Automatic Tuning System
AV	External Audio Video
AVL	Automatic Volume Leveler
BCL	Beam Current Limitation
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
CC	Closed Caption
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Color Transient Improvement manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
CVI	Component Video Input
DAC	Digital to Analogue Converter
DBX	Dynamic Bass Expander or noise reduction system in BTSC
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFU	Direction For Use: description for the end user
DNR	Dynamic Noise Reduction
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extra High Tension
EHT-INFO	Extra High Tension information
EPG	Electronic Programming Guide
EU	Europe
EW	East West, related to horizontal deflection of the set
EXT	External (source), entering the set via SCART or Cinch
FBL	Fast Blanking: DC signal accompanying RGB signals
FILAMENT	Filament of CRT
FM	Field Memory or Frequency Modulation
H	Horizontal sync signal
HP	Headphone
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus
IF	Intermediate Frequency
IIC	Integrated IC bus
ITV	Institutional TV
LATAM	Latin American countries like Brazil, Argentina, etc.
LED	Light Emitting Diode
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LS	Large Screen or Loudspeaker
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
NC	Not Connected
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
NTSC	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
OB	Option Bit
OC	Open Circuit
OP	Option Byte
OSD	On Screen Display
PAL	Phase Alternating Line. Color system mainly used in West Europe (color carrier = 4.433619 MHz) and South America (color carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
PCB	Printed Circuit board
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POR	Power-On Reset
PTP	Picture Tube Panel (or CRT-panel)
RAM	Random Access Memory
RC	Remote Control handset
RGB	Red, Green, and Blue video signals
ROM	Read Only Memory
SDAM	Service Default / Alignment Mode
SAP	Second Audio Program
SC	Sandcastle: pulse derived from sync signals
S/C	Short Circuit
SCL	Serial Clock
SDA	Serial Data
SECAM	SEequence Couleur Avec Memoire. Color system mainly used in France and East Europe. Color carriers = 4.406250 MHz and 4.250000 MHz
StF	Sound Intermediate Frequency
SS	Small Screen
STBY	Standby
SVHS	Super Video Home System
SW	Software
THD	Total Harmonic Distortion
TXT	Teletext
uP	Microprocessor
UOC	Ultimate One Chip
V	Vertical sync signal
V_BAT	Main supply voltage for the deflection stage (mostly 141 V)
V-chip	Violence Chip
VCR	Video Cassette Recorder
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
YC	Luminence (Y) and Chrominence (C)

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Philips Consumer Electronics

Technical Service Data

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Parts List

REFER TO SAFETY GUIDELINES

SAFETY NOTICE: ANY PERSON ATTEMPTING TO SERVICE THIS CHASSIS MUST FAMILIARIZE HIMSELF WITH THE CHASSIS AND BE AWARE OF THE NECESSARY SAFETY PRECAUTIONS TO BE USED WHEN SERVICING ELECTRONIC EQUIPMENT CONTAINING HIGH VOLTAGES.

CAUTION: USE A SEPARATE ISOLATION TRANSFORMER FOR THIS UNIT WHEN SERVICING

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Main Chassis

Main Chassis

0136	IC-Spring.	3104 301 22081
0137	Spring	3139 121 24583
0141	IC-Spring.	3104 301 22081
0211	Connector, 2 Pin	2422 025 16269
0212	Connector, 2 Pin	2422 025 16375
0217	Connector, 3 Pin	2412 020 00725
0221	Connector, 4 Pin	2422 025 15503
0222	Connector, 2 Pin	2422 025 10646
0223	Socket, Cinch, 9 Pin	2422 026 05236
0225	Socket, MDIN, 10 Pin	2422 026 04926
0246	Connector, 5 Pin	2422 025 15848
1000	Tuner, V+U PLL	2422 542 90141
1001	Filter, SAW, 45MHz75.	2422 549 44327
1121	Connector, 3 Pin	2412 020 00725
1124	Connector, 6 Pin	2422 025 12482
1201	Filter, Ceramic, 4MHz5	2422 549 40807
1300	Connector, 8 Pin	2422 025 04856
S 1302	Socket, CRT, 9 Pin, N-Neck	2422 500 80076
S 1504	Fuse, 4A, 250V, IEC.	2422 086 10914
1515	Relay, 12V, 5A	2422 132 07467
1600	Switch, Tactile.	2422 128 02742
1601	Switch, Tactile.	2422 128 02742
1602	Switch, Tactile.	2422 128 02742
1603	Switch, Tactile.	2422 128 02742
1606	Switch, Tactile.	2422 128 02742
1621	Crystal, 12MHz	2422 543 01268
1622	Connector, 8 Pin	2422 025 04856
2001	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2002	Cap, 100u, 20%, 16v, Electrolytic.	3198 028 21010
2003	Cap, 22p, 5%, 50v, Ceramic	3198 016 32290
2004	Cap, 22p, 5%, 50v, Ceramic	3198 016 32290
2005	Cap, 47n, +80/-20%, 50v, Ceramic	3198 024 44730
2006	Cap, 470u, 20%, 10v, Electrolytic.	3198 025 14710
2007	Cap, 10u, 20%, 50v, Electrolytic	3198 025 51090
2101	Cap, 470n, +80/-20%, 10v, Ceramic.	3198 017 44740
2102	Cap, 22p, 5%, 50v, Ceramic	3198 016 32290
2103	Cap, 330p, 10%, 50v, Ceramic	3198 017 33310
2104	Cap, 330p, 10%, 50v, Ceramic	3198 017 33310
2105	Cap, 10u, 20%, 25v, Electrolytic	3198 029 31090
2106	Cap, 10u, 20%, 25v, Electrolytic	3198 029 31090
2111	Cap, 22p, 5%, 50v, Ceramic	3198 016 32290
2112	Cap, 22p, 5%, 50v, Ceramic	3198 016 32290
2113	Cap, 22p, 5%, 50v, Ceramic	3198 016 32290
2122	Cap, 330p, 10%, 50v, Ceramic	3198 017 33310
2123	Cap, 1u, +80/-20%, 10v, Ceramic.	3198 017 41050
2124	Cap, 330p, 10%, 50v, Ceramic	3198 017 33310
2125	Cap, 1u, +80/-20%, 10v, Ceramic.	3198 017 41050
2132	Cap, 1u, +80/-20%, 10v, Ceramic.	2020 552 95731
2134	Cap, 1u, +80/-20%, 10v, Ceramic.	2020 552 95731
2135	Cap, 22p, 5%, 50v, Ceramic	3198 016 32290
2136	Cap, 22p, 5%, 50v, Ceramic	3198 016 32290
2161	Cap, 2u2, +80/-20%, 10v, Ceramic	3198 017 22250
2163	Cap, 2u2, +80/-20%, 10v, Ceramic	3198 017 22250
2201	Cap, 4n7, 10%, 50v, Ceramic.	3198 017 34720
2202	Cap, 330p, 5%, 50v, Ceramic.	3198 016 33310
2203	Cap, 470n, +80/-20%, 10v, Ceramic.	3198 017 44740
2205	Cap, 10u, 20%, 50v, Electrolytic	3198 028 51090
2206	Cap, 33p, 5%, 50v, Ceramic	3198 016 33390
2207	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2208	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2209	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2210	Cap, 220n, 10%, 10v, Ceramic	3198 017 32240
2211	Cap, 1n, 5%, 25v, Ceramic.	3198 016 31020
2212	Cap, 220n, 10%, 10v, Ceramic	3198 017 32240
2231	Cap, 22n, 10%, 25v, Ceramic.	3198 017 32230
2232	Cap, 22n, 10%, 25v, Ceramic.	3198 017 32230
2233	Cap, 22n, 10%, 25v, Ceramic.	3198 017 32230
2300	Cap, 330p, 5%, 50v, Ceramic.	3198 016 33310
2301	Cap, 390p, 5%, 50v, Ceramic.	3198 016 33910
2302	Cap, 390p, 5%, 50v, Ceramic.	3198 016 33910
2303	Cap, 1n, 10%, 2000v, Ceramic	3198 019 71020
2304	Cap, 47n, 10%, 250v, Metalized Polyeste	2222 365 45473
2405	Cap, 47u, 20%, 160v, Electrolytic.	2020 021 91139
2406	Cap, 270n, 5%, 250v, Metalized Polypropylene.	2022 333 00258
2420	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2421	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2423	Cap, 8n2, 5%, 1K6v, Metalized Polypropylene	2022 333 00267
2424	Cap, 390p, 10%, 2000v, Ceramic	2020 558 90482
2426	Cap, 1n, 5%, 25v, Ceramic.	3198 016 31020
2427	Cap, 100n, +80/-20%, 25v, Ceramic.	3198 023 41040
2428	Cap, 47u, 20%, 16v, Electrolytic	3198 029 24790
2429	Cap, 220n, +80/-20%, 16v, Ceramic.	3198 017 42240
2441	Cap, 15n, 10%, 50v, Polyester.	3198 014 01530
2444	Cap, 470u, 20%, 16v, Electrolytic.	3198 025 24710
2446	Cap, 470u, 20%, 16v, Electrolytic.	3198 025 24710
2447	Cap, 22u, 20%, 250v, Electrolytic.	2020 012 93596
2452	Cap, 22n, 10%, 25v, Ceramic.	3198 017 32230
2455	Cap, 10u, 20%, 16v, Electrolytic	3198 028 21090
2457	Cap, 470p, 10%, 500v, Ceramic.	3198 019 44710
2460	Cap, 82n, 10%, 100v, Metalized Polyeste	2222 365 25823
2461	Cap, 1n, 5%, 25v, Ceramic.	3198 016 31020
2462	Cap, 1n, 5%, 25v, Ceramic.	3198 016 31020
2463	Cap, 47u, 20%, 50v, Electrolytic	3198 025 54790
2464	Cap, 470p, 5%, 50v, Ceramic.	3198 016 34710
2465	Cap, 10u, 20%, 160v, Electrolytic.	2022 031 00127
2470	Cap, 15n, 10%, 63v, Metalized Polyester	2022 318 00126
2473	Cap, 470p, 5%, 50v, Ceramic.	3198 016 34710
2481	Cap, 100p, 5%, 50v, Ceramic.	3198 016 31010
2482	Cap, 1u, +80/-20%, 10v, Ceramic.	3198 017 41050
2483	Cap, 4u7, +80/-20%, 10v, Ceramic	2020 552 96305
2484	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2485	Cap, 1u, +80/-20%, 10v, Ceramic.	3198 017 41050
2486	Cap, 4n7, 10%, 50v, Ceramic.	3198 017 34720
2487	Cap, 2n2, 10%, 50v, Ceramic.	3198 017 32220
2488	Cap, 100n, 10%, 63v, Metalized Polyeste	2222 370 75104
2489	Cap, 1n, 10%, 50v, Ceramic	3198 017 31020
2491	Cap, 470u, 20%, 10v, Electrolytic.	3198 025 14710
2492	Cap, 22u, 20%, 25v, Electrolytic	3198 029 32290
2493	Cap, 470u, 20%, 10v, Electrolytic.	3198 025 14710
2494	Cap, 47u, 20%, 16v, Electrolytic	3198 028 24790
2496	Cap, 1n, 10%, 50v, Ceramic	3198 017 31020
2497	Cap, 1n, 10%, 50v, Ceramic	3198 017 31020
2500	Cap, 470n, 20%, 275V, Metalized Polypropylene	2222 338 22474
2501	Cap, 2n2, 10%, 1000v, Ceramic.	3198 019 52220
2502	Cap, 2n2, 10%, 1000v, Ceramic.	3198 019 52220
2503	Cap, 220u, 20%, 200v, Electrolytic	2020 024 90585
S 2515	Cap, 1n5, 20%, 250v, Ceramic	2020 554 90199
2520	Cap, 10n, 50v, CER2, 0603, X7R	3198 017 31030
2521	Cap, 22u, 20%, 50v, Electrolytic	3198 025 52290
2522	Cap, 1n, 10%, 50v, Ceramic	3198 017 31020
2523	Cap, 1n5, 10%, 2000v, Ceramic.	3198 019 71520
2525	Cap, 680p, 10%, 50v, Ceramic	3198 017 36810
2527	Cap, 56p, 5%, 50v, Ceramic	3198 016 35690
2528	Cap, 22u, 20%, 50v, Electrolytic	3198 025 52290
2540	Cap, 15n, 10%, 50v, Ceramic.	3198 017 31530
2541	Cap, 4n7, 10%, 50v, Ceramic.	3198 017 34720
2542	Cap, 470n, +80/-20%, 10v, Ceramic.	3198 017 44740
2543	Cap, 1n, 10%, 50v, Ceramic	3198 017 31020
2560	Cap, 2n2, 10%, 50v, Ceramic.	3198 019 12220
2561	Cap, 2u2, 20%, 16v, Electrolytic	3198 026 22220
2562	Cap, 1n, 10%, 2000v, Ceramic	3198 019 71020
2564	Cap, 47u, 20%, 160v, Electrolytic.	2020 021 91358
2580	Cap, 47u, 20%, 25v, Electrolytic	3198 025 34790
2585	Cap, 1n, 10%, 50v, Ceramic	3198 017 31020
2602	Cap, 33p, 2%, 50v, Ceramic	2020 552 96664
2603	Cap, 33p, 2%, 50v, Ceramic	2020 552 96664
2604	Cap, 10u, 20%, 16v, Electrolytic	3198 028 21090
2605	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2607	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2608	Cap, 1u, +80/-20%, 10v, Ceramic.	3198 017 41050
2609	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2612	Cap, 220u, 20%, 16v, Electrolytic.	3198 025 22210
2615	Cap, 820p, 10%, 50v, Ceramic	2238 586 55622
2616	Cap, 10u, 20%, 16v, Electrolytic	3198 028 21090
2641	Cap, 1n, 5%, 25v, Ceramic.	3198 016 31020
2642	Cap, 1n, 5%, 25v, Ceramic.	3198 016 31020
2643	Cap, 220p, 5%, 50v, Ceramic.	3198 016 32210
2691	Cap, 100u, 20%, 10v, Electrolytic.	3198 025 11010
2821	Cap, 100u, 20%, 10v, Electrolytic.	3198 025 11010
2822	Cap, 33n, 10%, 16v, Ceramic.	3198 017 33330
2823	Cap, 10u, 20%, 100v, Electrolytic.	3198 025 71090
2824	Cap, 10u, 20%, 100v, Electrolytic.	3198 025 71090
2825	Cap, 39n, 10%, 16v, Ceramic.	2238 786 55644
2826	Cap, 15n, 10%, 50v, Ceramic.	3198 017 31530
2827	Cap, 33n, 10%, 16v, Ceramic.	3198 017 33330
2828	Cap, 10n, 50v, CER2, 0603, X7R	3198 017 31030
2829	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2830	Cap, 10u, 20%, 100v, Electrolytic.	3198 025 71090
2831	Cap, 10u, 20%, 100v, Electrolytic.	3198 025 71090
2832	Cap, 10u, 20%, 100v, Electrolytic.	3198 025 71090
2833	Cap, 10u, 20%, 100v, Electrolytic.	3198 025 71090
2835	Cap, 10n, 50v, CER2, 0603, X7R	3198 017 31030
2836	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2837	Cap, 470n, +80/-20%, 10v, Ceramic.	3198 017 44740
2838	Cap, 10u, 20%, 100v, Electrolytic.	3198 025 71090
2841	Cap, 4u7, +80/-20%, 10v, Ceramic	2020 552 96305
2844	Cap, 2u2, 20%, 50v, Electrolytic	3198 028 52280
2845	Cap, 4u7, 20%, 50v, Electrolytic	3198 028 54780
2846	Cap, 10u, 20%, 100v, Electrolytic.	3198 025 71090
2847	Cap, 100u, 20%, 16v, Electrolytic.	3198 029 21010
2848	Cap, 330n, +80/-20%, 16v, Ceramic.	2238 786 19856
2849	Cap, 22n, 10%, 25v, Ceramic.	3198 017 32230
2850	Cap, 3u3, 20%, 50v, Electrolytic	2020 009 90103
2851	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2852	Cap, 100n, 10%, 16v, Ceramic	3198 017 31040
2855	Cap, 1u, +80/-20%, 10v, Ceramic.	3198 017 41050
2856	Cap, 1u, +80/-20%, 10v, Ceramic.	3198 017 41050
2857	Cap, 47n, 10%, 16v, Ceramic.	3198 017 34730
2858	Cap, 1u, +80/-20%, 10v, Ceramic.	3198 017 41050

S = Safety Part Be sure to use exact replacement part.

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2859	Cap, 1u, +80/-20%, 10v, Ceramic. . . .	2238 246	59863
2860	Cap, 100n, 10%, 16v, Ceramic	3198 017	31040
2861	Cap, 220p, 5%, 50v, Ceramic.	3198 016	32210
2862	Cap, 220p, 5%, 50v, Ceramic.	3198 016	32210
2863	Cap, 220p, 5%, 50v, Ceramic.	3198 016	32210
2903	Cap, 1u, 20%, 50v, Electrolytic. . . .	3198 025	51080
2904	Cap, 470n, +80/-20%, 10v, Ceramic. . .	3198 017	44740
2906	Cap, 470n, +80/-20%, 10v, Ceramic. . .	3198 017	44740
2908	Cap, 4u7, 20%, 35v, Electrolytic . . .	3198 028	44780
2909	Cap, 10u, 20%, 50v, Electrolytic . . .	3198 025	51090
2950	Cap, 1n5, 10%, 50v, Ceramic.	3198 017	31520
2951	Cap, 820p, 5%, 25v, Ceramic.	3198 016	38210
2952	Cap, 820p, 5%, 25v, Ceramic.	3198 016	38210
3001	Res, 1K5, 5%, 1/16W, Metalized Glass .	3198 021	31520
3002	Res, 8K2, 5%, 1/16W, Metalized Glass .	3198 021	38220
3003	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3004	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3005	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3101	Res, 68 ohm, 5%, 1/16W, Metalized Glass	3198 021	36890
3102	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3103	Res, 150 ohm, 5%, 1/16W, Metalized Glas	3198 021	31510
3104	Res, 220K, 5%, 1/16W, Metalized Glass.	3198 021	32240
3105	Res, 150 ohm, 5%, 1/16W, Metalized Glas	3198 021	31510
3106	Res, 220K, 5%, 1/16W, Metalized Glass.	3198 021	32240
3111	Res, 75 ohm, 5%, 1/16W, Metalized Glass	3198 021	37590
3112	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3113	Res, 75 ohm, 5%, 1/16W, Metalized Glass	3198 021	37590
3114	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3115	Res, 75 ohm, 5%, 1/16W, Metalized Glass	3198 021	37590
3116	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3122	Res, Zero ohm, "Chip" Jumper	3198 021	90030
3123	Res, 150 ohm, 5%, 1/16W, Metalized Glas	3198 021	31510
3124	Res, 47K, 5%, 1/16W, Metalized Glass .	3198 021	34730
3125	Res, 150 ohm, 5%, 1/16W, Metalized Glas	3198 021	31510
3126	Res, 47K, 5%, 1/16W, Metalized Glass .	3198 021	34730
3135	Res, 75 ohm, 5%, 1/16W, Metalized Glass	3198 021	37590
3136	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3137	Res, 75 ohm, 5%, 1/16W, Metalized Glass	3198 021	37590
3138	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3161	Res, 33K, 5%, 1/16W, Metalized Glass .	3198 021	33330
3162	Res, 10K, 5%, 1/16W, Metalized Glass .	3198 021	31030
3163	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3164	Res, 33K, 5%, 1/6W, Carbon Film. . . .	3198 011	03330
3201	Res, 3K9, 5%, 1/16W, Metalized Glass .	3198 021	33920
3202	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3203	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3204	Res, 82 ohm, 5%, 1/16W, Metalized Glass	2322 702	60829
3205	Res, 270 ohm, 5%, 1/16W, Metalized Glas	3198 021	32710
3206	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3207	Res, 390 ohm, 5%, 1/16W, Metalized Glas	3198 021	33910
3208	Res, 560 ohm, 5%, 1/6W, Carbon Film. .	3198 011	05610
3209	Res, 470 ohm, 5%, 1/16W, Metalized Glas	3198 021	34710
3210	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3231	Res, 560 ohm, 5%, 1/16W, Metalized Glas	3198 021	35610
3232	Res, 1K, 5%, 1/6W, Carbon Film	3198 011	01020
3300	Res, 18K, 5%, 2 1/2W, Metal Film . . .	2322 195	63183
3301	Res, 1K5, 20%, 1/2W, Carbon Film . . .	3198 013	01520
3303	Res, 330 ohm, 5%, 1/16W, Metalized Glas	3198 021	33310
3304	Res, 18K, 5%, 2 1/2W, Metal Film . . .	2322 195	63183
3305	Res, 1K5, 20%, 1/2W, Carbon Film . . .	3198 013	01520
3307	Res, 330 ohm, 5%, 1/16W, Metalized Glas	3198 021	33310
3308	Res, 18K, 5%, 2 1/2W, Metal Film . . .	2322 195	63183
3309	Res, 1K5, 20%, 1/2W, Carbon Film . . .	3198 013	01520
3311	Res, 390 ohm, 5%, 1/16W, Metalized Glas	3198 021	33910
3313	Res, 68 ohm, 5%, 1/3W, Metal Film. . .	2306 204	03689
3318	Res, 220 ohm, 5%, 1/3W, Metal Film . .	2306 204	03221
3319	Res, 1K5, 20%, 1/2W, Carbon Film . . .	3198 013	01520
3402	Res, 2K2, 5%, 1/2W, Metal Film	2306 207	03222
3403	Res, 2K2, 5%, 1/2W, Metal Film	2306 207	03222
3410	Res, 68K, 5%, 1/6W, Carbon Film. . . .	3198 011	06830
3422	Res, 330K, 5%, 1/4W, Metalized Glass .	2322 241	53334
3424	Res, 47 ohm, 5%, 1 1/3W, Metal Film. .	3198 012	24790
3425	Res, 220 ohm, 1%, 3/5W, Metal Film . .	2312 915	12201
3426	Res, 47 ohm, 5%, 1/6W, Carbon Film . .	3198 011	04790
3428	Res, 68 ohm, 5%, 1/6W, Carbon Film . .	3198 011	06890
3430	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3432	Res, 470 ohm, 5%, 1/16W, Metalized Glas	3198 021	34710
3439	Res, 150K, 1%, 3/5W, Metal Film. . . .	2312 915	11504
3440	Res, 33K, 1%, 1/16W, Metalized Glass .	2322 704	63303
3441	Res, 27K, 5%, 1/16W, Metalized Glass .	3198 021	32730
3442	Res, 100K, 5%, 1/6W, Carbon Film . . .	3198 011	01040
3443	Res, 3R3, 5%, 1/3W, Metal Film	2306 204	03338
3444	Res, 3R3, 5%, 1/3W, Metal Film	2306 204	03338
S 3445	Res, 1 ohm, 5%, 1/3W, Metal Film . . .	2306 204	03108
S 3446	Res, 1 ohm, 5%, 1/3W, Metal Film . . .	2306 204	03108
3447	Res, 47K, 5%, 1/16W, Metalized Glass .	3198 021	34730
S 3448	Res, 1 ohm, 5%, 1/3W, Metal Film . . .	2306 204	03108
3449	Res, 27K, 5%, 1/6W, Carbon Film. . . .	3198 011	02730
3450	Res, 27K, 5%, 1/6W, Carbon Film. . . .	3198 011	02730
3451	Res, 1K8, 5%, 1/16W, Metalized Glass .	3198 021	31820
3452	Res, 1M, 5%, 1/6W, Carbon Film	3198 011	01050
3453	Res, 100K, 5%, 1/16W, Metalized Glass.	3198 021	31040
3454	Res, 10K, 5%, 1/16W, Metalized Glass .	3198 021	31030
3455	Res, 680 ohm, 5%, 1/16W, Metalized Glas	3198 021	36810
3459	Res, 150K, 5%, 1/6W, Carbon Film . . .	3198 011	01540
3460	Res, 100K, 5%, 1/16W, Metalized Glass.	3198 021	31040
3461	Res, 2K2, 5%, 1/16W, Metalized Glass .	3198 021	32220
3462	Res, 1M, 5%, 1/16W, Metalized Glass. .	3198 021	31050
3463	Res, 2K2, 5%, 1/16W, Metalized Glass .	3198 021	32220
3464	Res, 2K2, 5%, 1/6W, Carbon Film. . . .	3198 011	02220
3465	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3466	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3468	Res, 330 ohm, 5%, 1/6W, Carbon Film. .	3198 011	03310
S 3470	Res, 1 ohm, 5%, 1/3W, Metal Film . . .	2306 204	03108
3471	Res, 220 ohm, 5%, 1/6W, Carbon Film. .	3198 011	02210
3472	Res, 220 ohm, 5%, 1/6W, Carbon Film. .	3198 011	02210
3473	Res, 2R7, 1%, 3/5W, Metal Film	2312 915	12708
3473	Res, 3R3, 1%, 3/5W, Metal Film	2312 915	13308
3474	Res, 3R3, 1%, 3/5W, Metal Film	2312 915	13308
3475	Res, 10K, 5%, 1/6W, Carbon Film. . . .	3198 011	01030
3476	Res, 8K2, 5%, 1/6W, Carbon Film. . . .	3198 011	08220
3478	Res, 1 ohm, 5%, 1/6W, Carbon Film. . .	3198 011	01080
3479	Res, 18 ohm, 5%, 1/3W, Metal Film. . .	2306 204	03189
3480	Res, 39K, 5%, 1/16W, Metalized Glass .	3198 021	33930
3481	Res, 18K, 5%, 1/16W, Metalized Glass .	3198 021	31830
3483	Res, 1M, 5%, 1/6W, Carbon Film	3198 011	01050
3485	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3486	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3487	Res, 33K, 5%, 1/16W, Metalized Glass .	3198 021	33330
3488	Res, 1K5, 5%, 1/6W, Carbon Film. . . .	3198 011	01520
3489	Res, 10K, 5%, 1/16W, Metalized Glass .	3198 021	31030
3490	Res, 3K3, 5%, 1/6W, Carbon Film. . . .	3198 011	03320
3491	Res, 47K, 5%, 1/6W, Carbon Film. . . .	3198 011	04730
3492	Res, 18K, 5%, 1/16W, Metalized Glass .	3198 021	31830
3493	Res, 18 ohm, 5%, 1/3W, Metal Film. . .	2306 204	03189
3495	Res, 33 ohm, 5%, 1/6W, Carbon Film . .	3198 011	03390
3497	Res, 390 ohm, 5%, 1/6W, Carbon Film. .	3198 011	03910
3498	Res, 10K, 5%, 1/6W, Carbon Film. . . .	3198 011	01030
3499	Res, 27K, 5%, 1/16W, Metalized Glass .	3198 021	32730
3500	Res, 3M3, 5%, 1/2W, Metalized Glass. .	2322 242	13335
3501	Res, 3M3, 5%, 1/2W, Metalized Glass. .	2322 242	13335
S 3502	NTC, B57237, 3W1, 4R7, 20%	2122 612	00055
3503	PTC, 3R, 144v, 20%	2122 663	00019
3506	Res, 330K, 5%, 1/4W, Metalized Glass .	2322 241	53334
3508	Res, 1M5, 5%, 1/2W, Metalized Glass. .	2322 242	13155
3509	Res, 220 ohm, 20%, 1/2W, Carbon Film .	3198 013	02210
S 3510	Surge Protector.	2422 549	43073
3519	Res, 3K3, 5%, 1/6W, Carbon Film. . . .	3198 011	03320
3520	Res, 1K2, 5%, 1/16W, Metalized Glass .	3198 021	31220
3522	Res, 330K, 5%, 1/16W, Metalized Glass.	3198 021	33340
3523	Res, 100 ohm, 5%, 1/3W, Metal Film . .	2306 204	03101
3524	Res, Zero ohm, "Chip" Jumper	3198 021	90030
3525	Res, 1K, 5%, 1/16W, Metalized Glass. .	3198 021	31020
3526	Res, OR15, 5%, 3/5W, Metal Film. . . .	3198 012	11570
3527	Res, 2K2, 5%, 1/3W, Metal Film	2306 204	03222
3528	Res, 10K, 5%, 1/16W, Metalized Glass .	3198 021	31030
3541	Res, 470 ohm, 5%, 1/16W, Metalized Glas	3198 021	34710
3542	Res, 1K5, 5%, 1/6W, Carbon Film. . . .	3198 011	01520
3543	Res, 82K, 1%, 3/5W, Metal Film	2312 915	18203
3544	Res, 6K8, 1%, 3/5W, Metal Film	2312 915	16802
3545	Res, 2K2, 5%, 1/16W, Metalized Glass .	3198 021	32220
3546	Res, 6K8, 5%, 1/6W, Carbon Film. . . .	3198 011	06820
3547	Res, 22K, 5%, 1/16W, Metalized Glass .	3198 021	32230
3548	Res, 15K, 5%, 1/16W, Metalized Glass .	3198 021	31530
3549	Res, 220 ohm, 5%, 1/6W, Carbon Film. .	3198 011	02210
3580	Res, 47K, 5%, 1/16W, Metalized Glass .	3198 021	34730
3581	Res, Zero ohm, "Chip" Jumper	3198 021	90030
3601	Res, 2K2, 5%, 1/16W, Metalized Glass .	3198 021	32220
3602	Res, 2K2, 5%, 1/16W, Metalized Glass .	3198 021	32220
3603	Res, 2K2, 5%, 1/6W, Carbon Film. . . .	3198 011	02220
3604	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3605	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3606	Res, 10K, 5%, 1/6W, Carbon Film. . . .	3198 011	01030
3607	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3608	Res, 150K, 5%, 1/16W, Metalized Glass.	3198 021	31540
3618	Res, 1K, 5%, 1/6W, Carbon Film	3198 011	01020
3619	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3620	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3621	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3624	Res, 10K, 5%, 1/6W, Carbon Film. . . .	3198 011	01030
3633	Res, 1K, 5%, 1/6W, Carbon Film	3198 011	01020
3634	Res, 1K, 5%, 1/6W, Carbon Film	3198 011	01020
3641	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3642	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3643	Res, 100 ohm, 5%, 1/16W, Metalized Glas	3198 021	31010
3644	Res, 4K7, 5%, 1/16W, Metalized Glass .	3198 021	34720
3646	Res, 1M, 5%, 1/16W, Metalized Glass. .	3198 021	31050
3681	Res, 820 ohm, 1%, 1/16W, Metalized Glas	2322 704	68201
3682	Res, 120 ohm, 1%, 1/16W, Metalized Glas	2322 704	61201
3683	Res, 120 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01210
3685	Res, 200 ohm, 1%, 1/16W, Metalized Glas	2322 704	62001
3686	Res, 430 ohm, 1%, 1/16W, Metalized Glas	2322 704	64301
3687	Res, 2K2, 1%, 1/16W, Metalized Glass .	2322 704	62202
3688	Res, 200 ohm, 1%, 1/16W, Metalized Glas	2322 704	62001

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3691	Res, 330 ohm, 5%, 1/16W, Metalized Glas	3198 021	33310
3693	Res, 220 ohm, 5%, 1/6W, Carbon Film. .	3198 011	02210
3694	Res, 4K7, 5%, 1/16W, Metalized Glass .	3198 021	34720
3822	Res, 220K, 5%, 1/16W, Metalized Glass.	3198 021	32240
3824	Res, Zero ohm, "Chip" Jumper	3198 021	90030
3827	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3828	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3841	Res, 180K, 5%, 1/16W, Metalized Glass.	2322 702	60184
3842	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3843	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011	01010
3901	Res, 1K, 5%, 1/6W, Carbon Film	3198 011	01020
3902	Res, 3K3, 5%, 1/6W, Carbon Film. . . .	3198 011	03320
3903	Res, 3K3, 5%, 1/6W, Carbon Film. . . .	3198 011	03320
3904	Res, 10K, 5%, 1/16W, Metalized Glass .	3198 021	31030
3905	Res, 3K3, 5%, 1/6W, Carbon Film. . . .	3198 011	03320
3906	Res, 10K, 5%, 1/16W, Metalized Glass .	3198 021	31030
3907	Res, 8K2, 5%, 1/16W, Metalized Glass .	3198 021	38220
3911	Res, 100K, 5%, 1/16W, Metalized Glass.	3198 021	31040
4122	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4123	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4124	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4126	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4127	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4129	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4132	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4133	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4151	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4152	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4300	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4301	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4302	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4303	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4306	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4405	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4491	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4571	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4610	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4661	Res, Zero ohm, "Chip" Jumper	3198 021	90020
4692	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4694	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4698	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4821	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4822	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4847	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4852	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4853	Res, Zero ohm, "Chip" Jumper	3198 021	90030
4922	Res, Zero ohm, "Chip" Jumper	3198 021	90030
5001	Coil, 820n	3198 018	18270
5002	Coil, 5u6.	3198 018	25680
5201	Coil, 4u7.	3198 018	14780
5402	Coil, 82u.	2422 536	00425
5421	Transformer, PSD10-204B.	2422 531	02589
S 5441	Transformer, LOT, JF0501-19272R. . . .	2422 531	02614
5482	Coil, 10u.	3198 018	11090
S 5502	Filter, Mains, 22mH.	2422 549	43056
5509	Fixed, Inductor, 100MHz, 50R.	3198 018	90010
5515	Fixed, Inductor, 100MHz, 80 ohm. . . .	3198 018	90020
5520	Transformer, PSS35-205B.	2422 531	02619
5521	Fixed, Inductor, 100MHz, 50R.	3198 018	90010
5560	Fixed, Inductor, 100MHz, 50R.	3198 018	90010
5562	Fixed, Inductor, 100MHz, 80 ohm. . . .	3198 018	90020
5563	Coil, 27u.	3198 018	22790
5601	Coil, 5u6.	3198 018	15680
5602	Coil, 5u6.	3198 018	15680
5603	Coil, 5u6.	3198 018	15680
5821	Coil, 10u.	3198 018	11090
5841	Coil, 10u.	3198 018	11090
6001	Zener Diode, 33 volt	3198 010	23390
6127	Zener Diode, 6.8 volt.	3198 020	56880
6161	Zener Diode, 6.8 volt.	3198 020	56880
6301	Diode, Signal, BAS316.	3198 010	10630
6307	Diode, Signal, BAS316.	3198 010	10630
6318	Zener Diode, 8.2 volt.	3198 020	58280
6422	Diode, Rect, BYV97G.	9335 214	80133
6423	Diode, Rect, 1N4006GP.	9338 386	60673
6426	Diode, Signal, BAS316.	3198 010	10630
6444	Diode, Rect, EGP20DL-5100	9322 164	42682
6445	Diode, Signal, BAS316.	3198 010	10630
6446	Diode, Rect, RGP10D	9337 516	60673
6447	Diode, Rect, RGP10D	9337 516	60673
6451	Diode, Signal, BAS316.	3198 010	10630
6452	Diode, Signal, BAS316.	3198 010	10630
6453	Zener Diode, 33 volt	3198 010	23390
6460	Diode, Signal, BAS316.	3198 010	10630
6461	Diode, Rect, RGP10D	9337 516	60673
6462	Diode, Rect, RGP10D	9337 516	60673
6463	Diode, Rect, RGP10D	9337 516	60673
6464	Diode, Signal, BAS316.	3198 010	10630
6481	Diode, Signal, BAS316.	3198 010	10630
6491	Diode, Signal, BAV70	9331 849	10215
6492	Zener Diode, 5.6 volt.	3198 020	55680
6500	Diode, Rect, 1N5062	3198 010	10120
6501	Diode, Rect, 1N5062	3198 010	10120
6502	Diode, Rect, 1N5062	3198 010	10120
6503	Diode, Rect, 1N5062	3198 010	10120
6520	Diode, Rect, RGP15D.	9335 187	60673
6522	Diode, Rect, RGP15D.	9335 187	60673
6540	Zener Diode, 6.2 volt.	9331 668	30133
6541	Zener Diode, 9.1 volt.	9331 177	80133
6560	Diode, Rect, SB340L-7024	9322 161	76682
6561	Diode, Rect, BYW76-RAS15/10.	9322 127	32682
6562	Diode, Rect, BYW76-RAS15/10.	9322 127	32682
6580	Diode, Signal, 1N4148.	3198 010	10010
6624	Diode, Signal, BAS316.	3198 010	10630
6625	Zener Diode, 8.2 volt.	3198 010	28280
6626	Diode, Signal, BAS316.	3198 010	10630
6627	Diode, Signal, BAS316.	3198 010	10630
6628	Diode, Signal, BAS316.	3198 010	10630
6681	Diode, Signal, BAS316.	3198 010	10630
6691	LED.	9322 185	69682
6692	IR Receiver.	9322 206	78667
6908	Zener Diode, 2.7 volt.	3198 020	52780
6909	Diode, Signal, 1N4148.	3198 010	10010
7101	Transistor, NPN, BC847B.	3198 010	42030
7161	Transistor, NPN, BC847B.	3198 010	42030
7162	Transistor, NPN, BC847B.	3198 010	42030
7200	IC TDA9377PS/N2/AI/1372.	9352 749	89112
7201	Transistor, NPN, BC847B.	3198 010	42030
7202	Transistor, NPN, BC847B.	3198 010	42030
7308	Transistor, NPN, BF422	3198 020	43010
7310	Transistor, NPN, BF422	3198 020	43010
7312	Transistor, NPN, BF422	3198 020	43010
7313	Transistor, NPN, BF422	3198 020	43010
7314	Transistor, PNP, BF423	3198 020	43020
7315	Transistor, NPN, BF422	3198 020	43010
7316	Transistor, PNP, BF423	3198 020	43020
7317	Transistor, NPN, BF422	3198 020	43010
7318	Transistor, PNP, BF423	3198 020	43020
7421	Transistor, NPN, BUT11APX.	9340 563	21127
7422	Transistor, NPN, BC817-25.	3198 010	43230
7423	Transistor, PNP, BC807-25.	3198 010	43130
7440	Transistor, PNP, BF423	3198 020	43020
7451	Transistor, PNP, BC857B.	3198 010	42150
7461	Transistor, PNP, BC857B.	3198 010	42150
7462	Transistor, PNP, BC857B.	3198 010	42150
7463	Transistor, NPN, BC546B.	9332 377	80126
7464	Transistor, NPN, BD135	3198 020	41010
7465	Transistor, PNP, BD136	3198 020	41020
7466	Transistor, NPN, BC847B.	3198 010	42030
7491	Transistor, NPN, BC847B.	3198 010	42030
7493	IC, L78L33ACZ.	9322 134	92676
7494	Transistor, NPN, BC337-25.	3198 020	43530
7496	Transistor, NPN, BD135	3198 020	41010
7515	Optic Coupler, TCET1103(G)	9322 140	14667
7520	IC, TEA1506T/N1.	9352 720	43118
7521	FET POW STP7NK80ZFP (ST00) L	9322 194	22687
7522	Side Jack Panel.	9340 547	00215
7523	Transistor, PNP, BC857B.	3198 010	42150
7540	Transistor, NPN, BC547B.	3198 020	40030
7541	Transistor, NPN, PDTC114ET	3198 010	44110
7580	Transistor, NPN, BC847B.	3198 010	42030
7601	Transistor, PNP, PDTA114ET	3198 010	44010
7641	IC, M24C16-WBN6.	9322 147	25682
7821	IC, AN5891K.	9322 191	49682
7841	IC, AN5829S.	9322 189	97668
7901	IC, AN7522N.	9322 181	41682
ACCORD	AC CORD.	3139 128	76161
CBA	Main Chassis Assy.	3141 058	81691

Cabinet Parts

	Cabinet Parts		
10	Power Button	3141 057	68711
11	Control Buttons.	3141 057	68721
14	Light Guide.	3139 124	47501
15	Chassis Guide.	3139 124	25893
16	Chassis Guide.	3139 124	25893
17	Nameplate.	3139 120	01601
194	Cabinet Back	3141 058	82511
1987	Batteries for Remote Transmitter . . .	9299 000	10137
S 1990	CRT, A51ERF135X82.	9301 903	81301
21	Side Jack Panel Bracket.	3141 054	22881
46	Front Lens Assembly.	3141 057	81012
S 5203	Coil, Degaussing	3139 128	23841
5994	Speaker, 16R, 5W	2422 264	00479
5995	Speaker, 16R, 5W	2422 264	00479
901	Cabinet Front.	3141 047	68701
REMOTE	Remote Transmitter, RC19335004/01. . .	3139 228	86464

Side A/V Jack Panel

	Side A/V Jack Panel		
0025	Cable, 3 Pin	3139 131	01771
0186	Cable, 5 Pin, 680mm.	3139 110	38861
0250	Socket, Cinch, 3 Pin	2422 026	04742
0252	Connector, 6 Pin	2422 025	12482

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0253	Socket, Phone, 1 Pin	2422 026 04747
0254	Connector, 5 Pin	2422 025 12481
0255	Connector, 4 Pin	2422 025 15847
1810	Connector, 3 Pin	2412 020 00725
2171	Cap, 330p, 10%, 50v, Ceramic	3198 019 13310
2172	Cap, 330p, 10%, 50v, Ceramic	3198 019 13310
2175	Cap, 22p, 5%, 50v, Ceramic	3198 019 02290
2176	Cap, 470p, 10%, 50v, Ceramic	3198 019 14710
2177	Cap, 10u, 20%, 50v, Electrolytic . . .	3198 025 51090
2178	Cap, 470p, 10%, 50v, Ceramic	3198 019 14710
2179	Cap, 10u, 20%, 50v, Electrolytic . . .	3198 025 51090
3142	Res, 100 ohm, 5%, 1/6W, Carbon Film. .	3198 011 01010
3143	Res, 75 ohm, 5%, 1/6W, Carbon Film . .	3198 011 07590
3144	Res, 150 ohm, 5%, 1/6W, Carbon Film. .	3198 011 01510
3145	Res, 47K, 5%, 1/6W, Carbon Film. . . .	3198 011 04730
3146	Res, 150 ohm, 5%, 1/6W, Carbon Film. .	3198 011 01510
3147	Res, 47K, 5%, 1/6W, Carbon Film. . . .	3198 011 04730
3148	Res, 270 ohm, 5%, 1/6W, Carbon Film. .	3198 011 02710
3149	Res, 270 ohm, 5%, 1/6W, Carbon Film. .	3198 011 02710
6171	Zener Diode, 6.8 volt.	3198 010 26880
CBA	Side Jack Panel.	3141 058 64941

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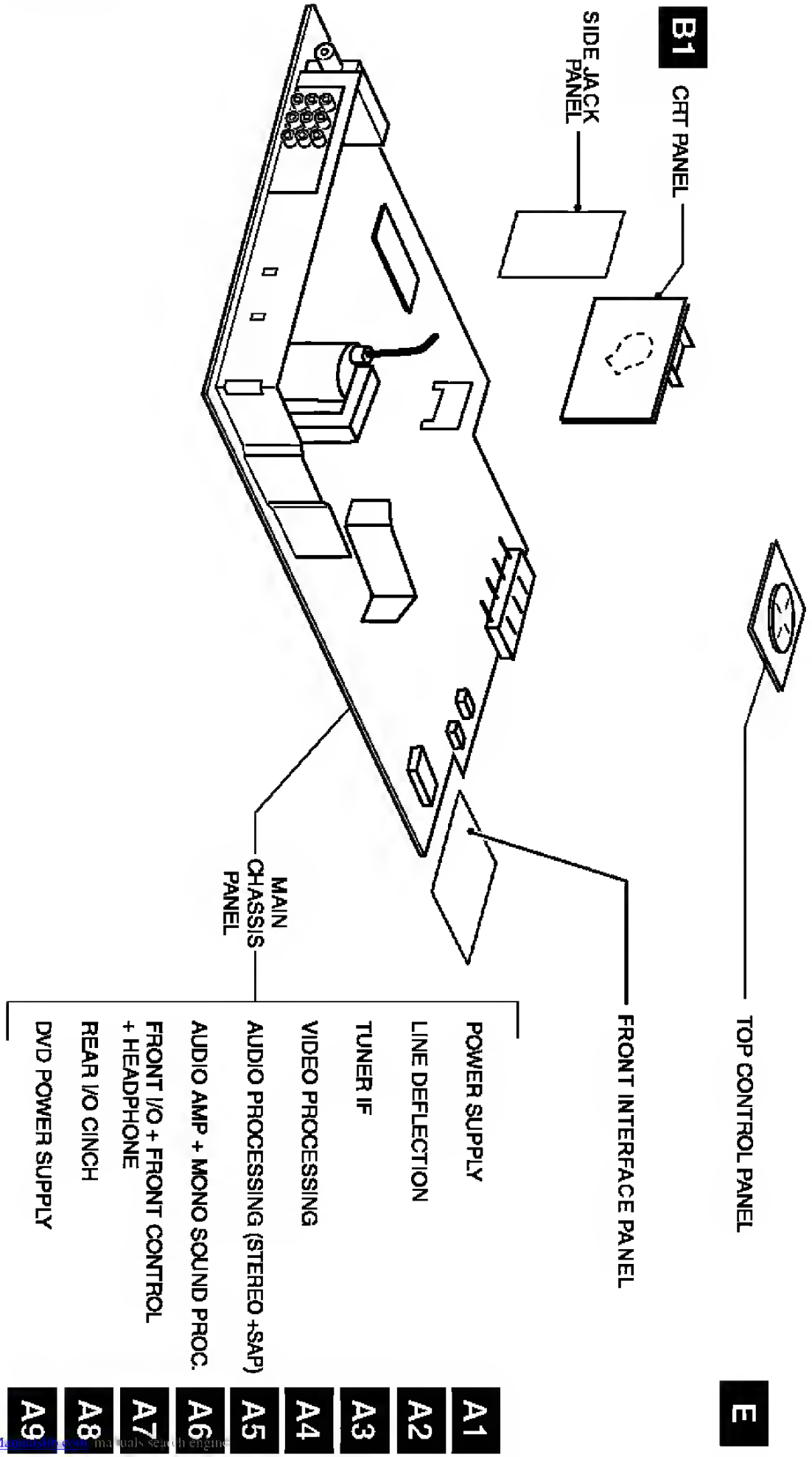

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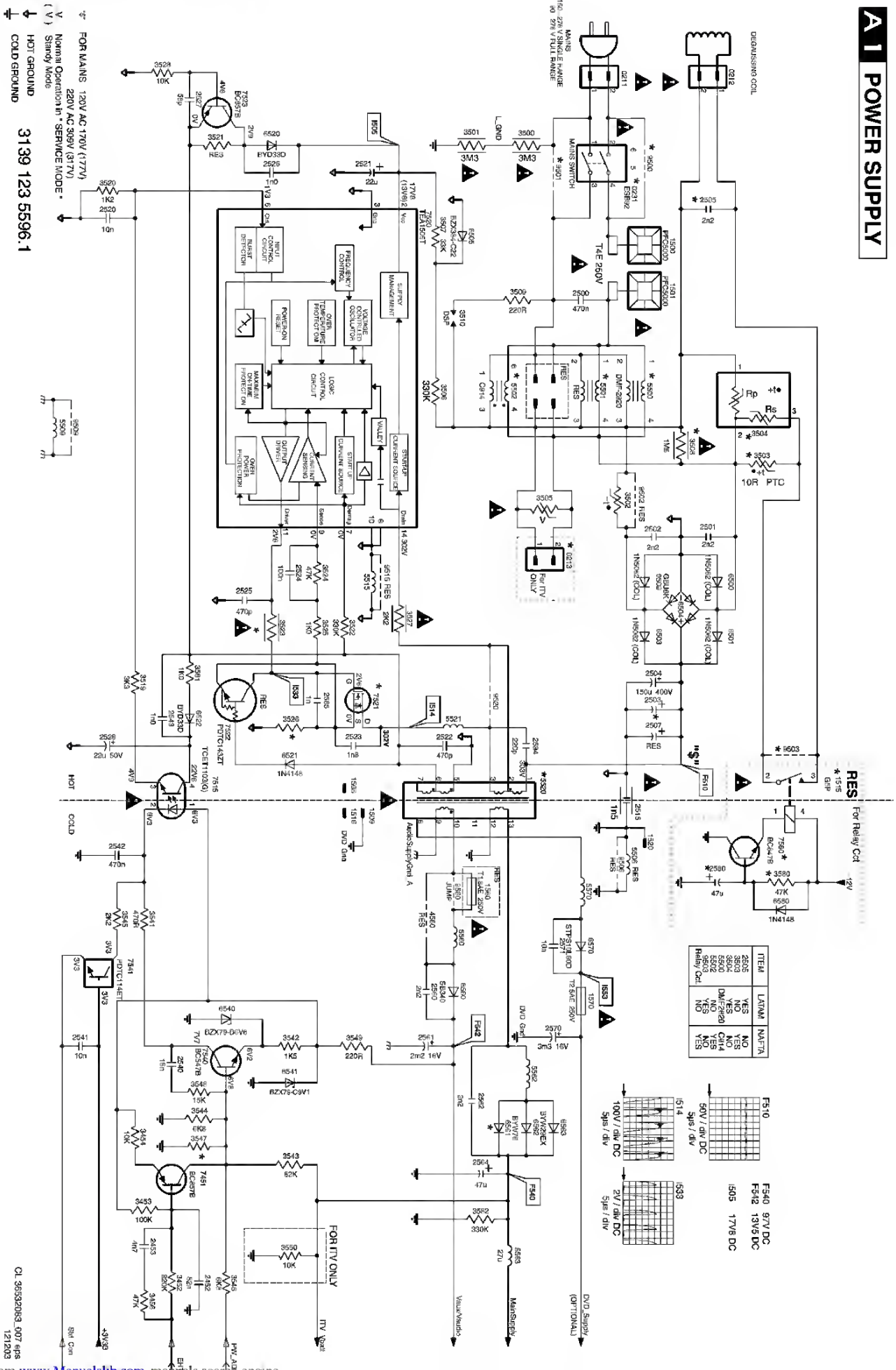

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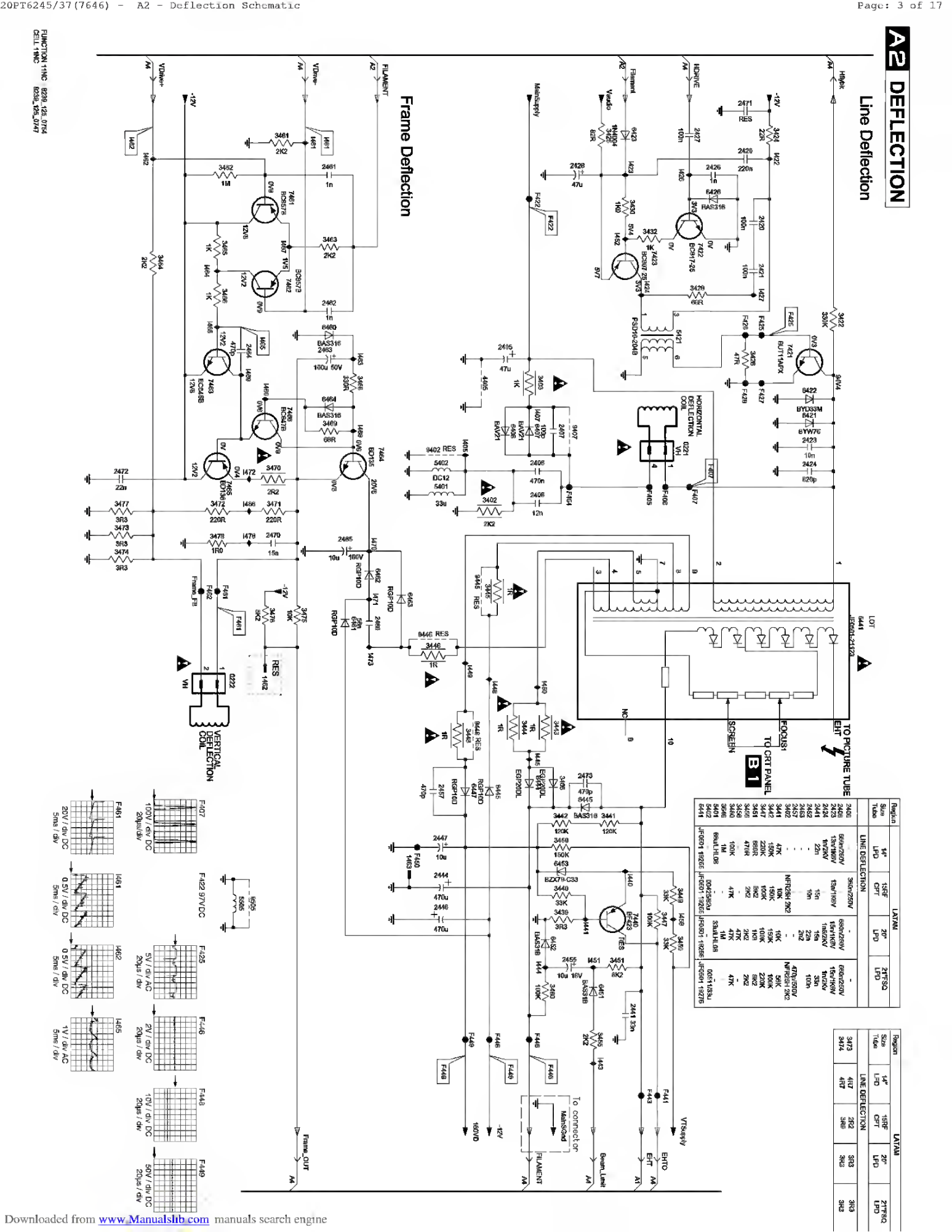

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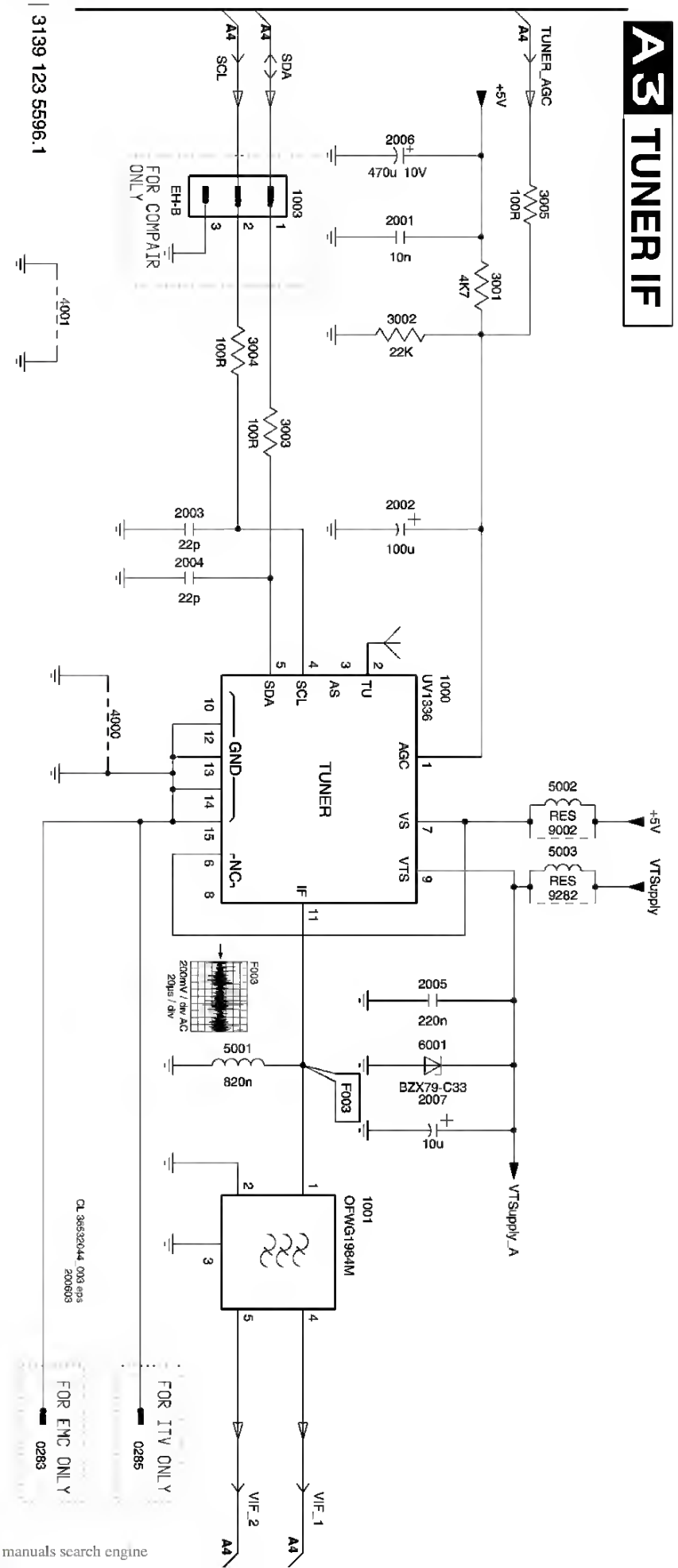

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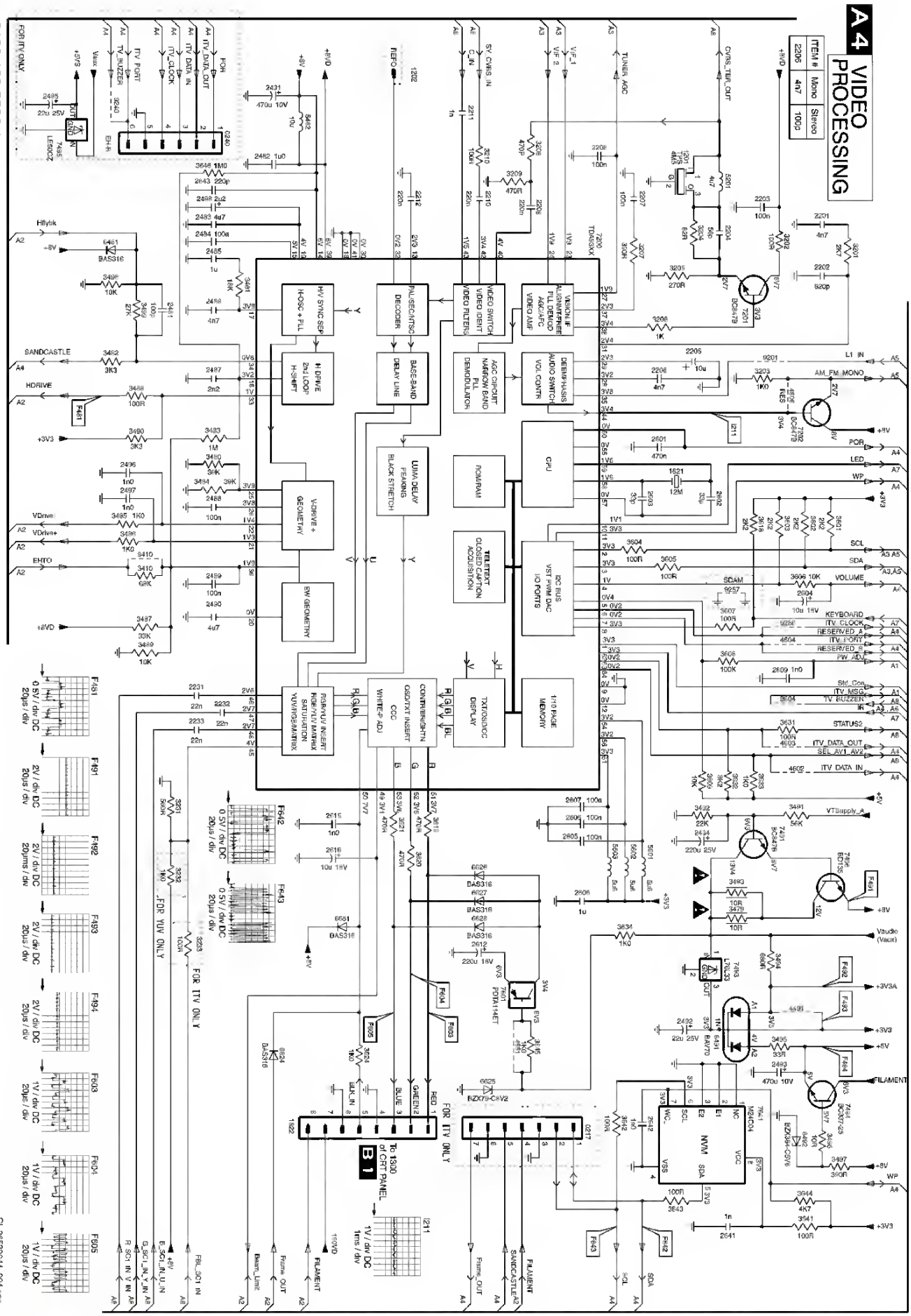
A4 VIDEO PROCESSING
3139 123 5596.1
ITEM # 2206 4n7 100p
Mono Stereo
FOR ITV ONLY
ITV PORT
ITV_BUZZER
ITV_CLOCK
ITV DATA IN
ITV DATA OUT
FOR
CVBS IN
CVBS_TER_OUT
TUNER AGC
V/F
TDA9370X
VIDEO IF PLL DEMOD AGC/AFC VIDEO AMP
VIDEO SWITCH VIDEO IDENT VIDEO FILTERS
PAL/SECAM/NTSC DECODER
BASE-BAND DELAY LINE
AGC CIRCUIT NARROW BAND PLL DEMODULATOR
H/V SYNC SEP H-OSC + PLL
H DRIVE 2nd LOOP H-SHIFT
V-DRIVE + GEOMETRY
EW GEOMETRY
LUMA DELAY PEAKING BLACK STRETCH
DEEMPHASIS AUDIO SWITCH VOL CONTR
CPU
ROM/RAM
TELETEXT CLOSED CAPTION ACQUISITION
I2C BUS VST,PWM DAC I/O PORTS
1/10 PAGE MEMORY
CONTR/BRGHTN OSD/TXT INSERT CCC WHITE-P ADJ
RGB/YUV INSERT RGB/YUV MATRIX SATURATION YUV/RGB/MATRIX
TXT/OSD/DCC DISPLAY
L1 IN
AM_FM_MONO
VOLUME
KEYBOARD
ITV_CLOCK
ITV_DATA
RESERVED_A
RESERVED_B
PW_ADJ
Std_Con
ITV_MSG
ITV_BUZZER
IR
STATUS2
ITV_DATA_OUT
SEL_AV1_AV2
ITV DATA IN
VTSupply_A
Vaudio (Vaux)
+3V3A
+3V3
+5V
FILAMENT
+8V
WP
SCL
SDA
FOR ITV ONLY
FOR YUV ONLY
B1
To 1530 of CRT PANEL
F491
F492
F493
F494
F603
F604
F605
F641
F642
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F644
F645
F646
F647
F648
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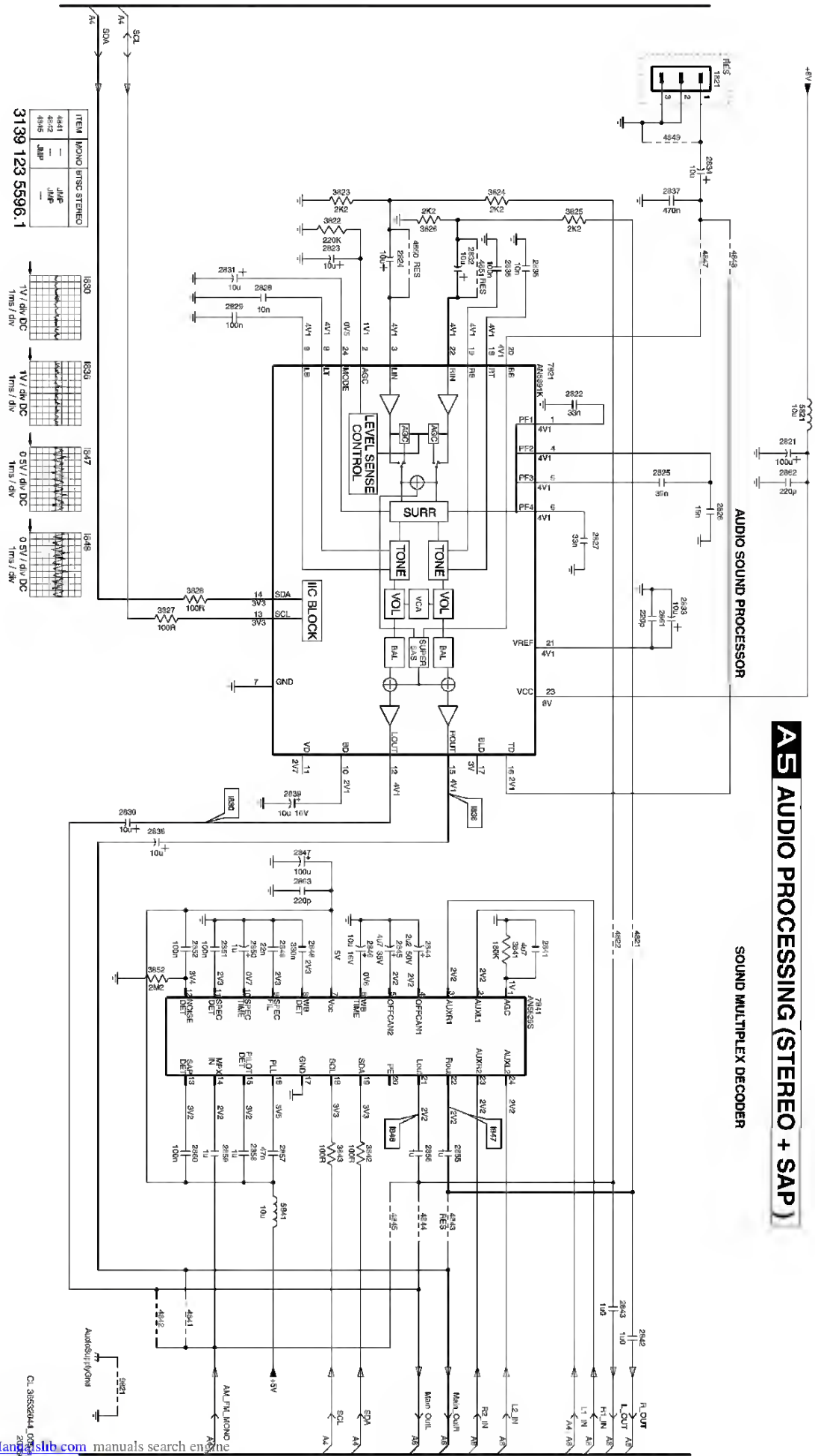

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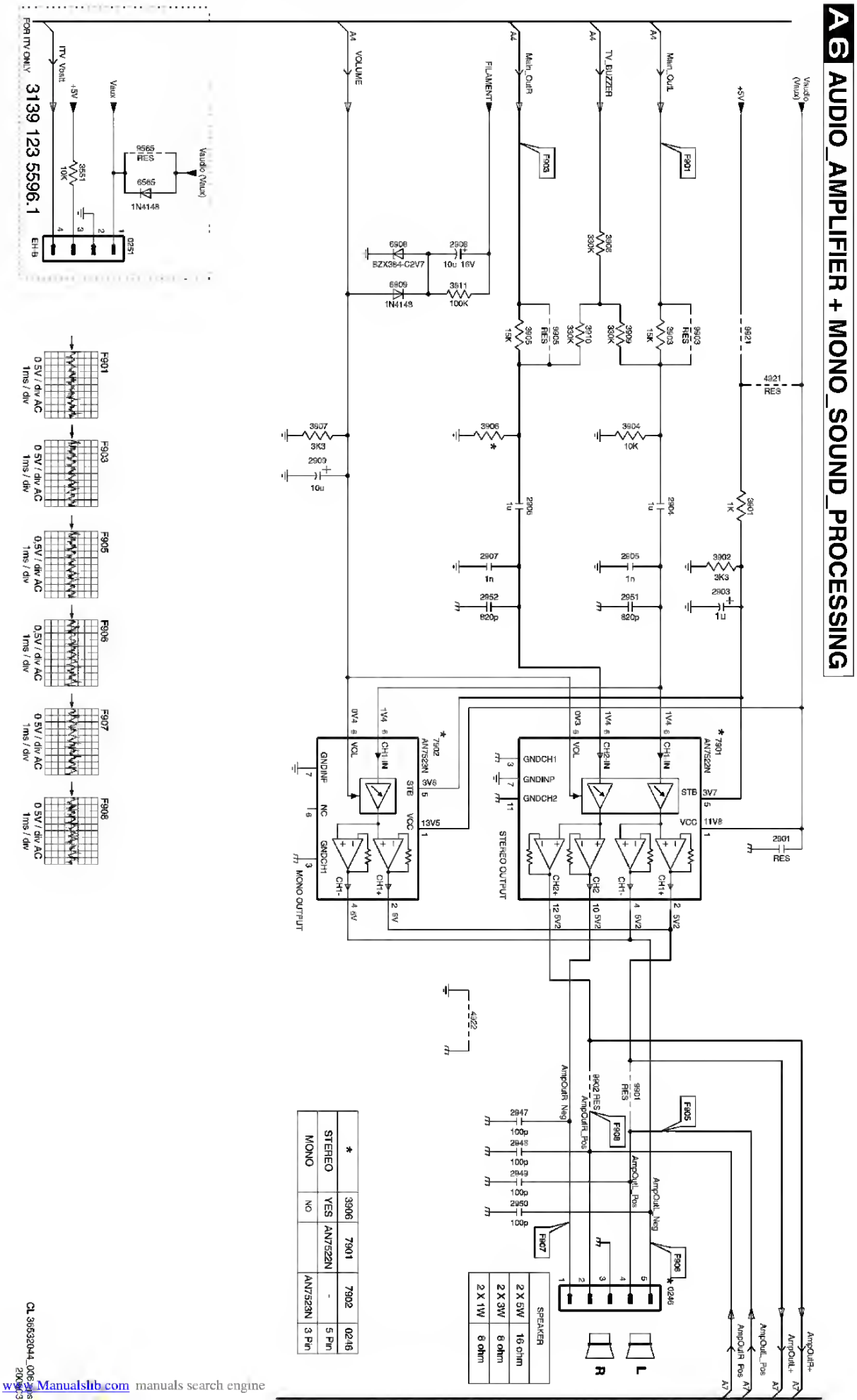

*	3906	7901	7902	0246
STEREO	YES	AN7522N	-	5 Pin
MONO	NO		AN7523N	3 Pin

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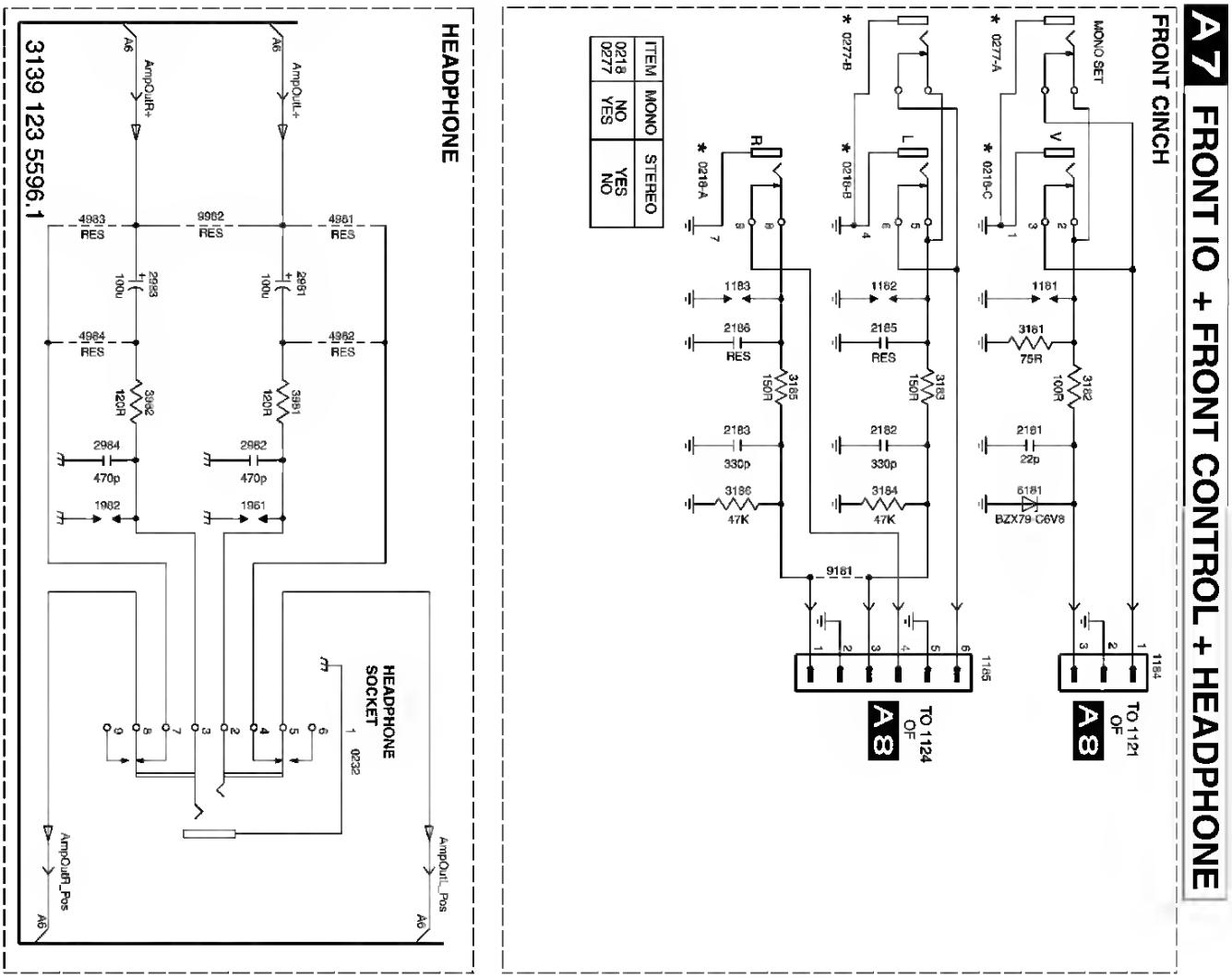

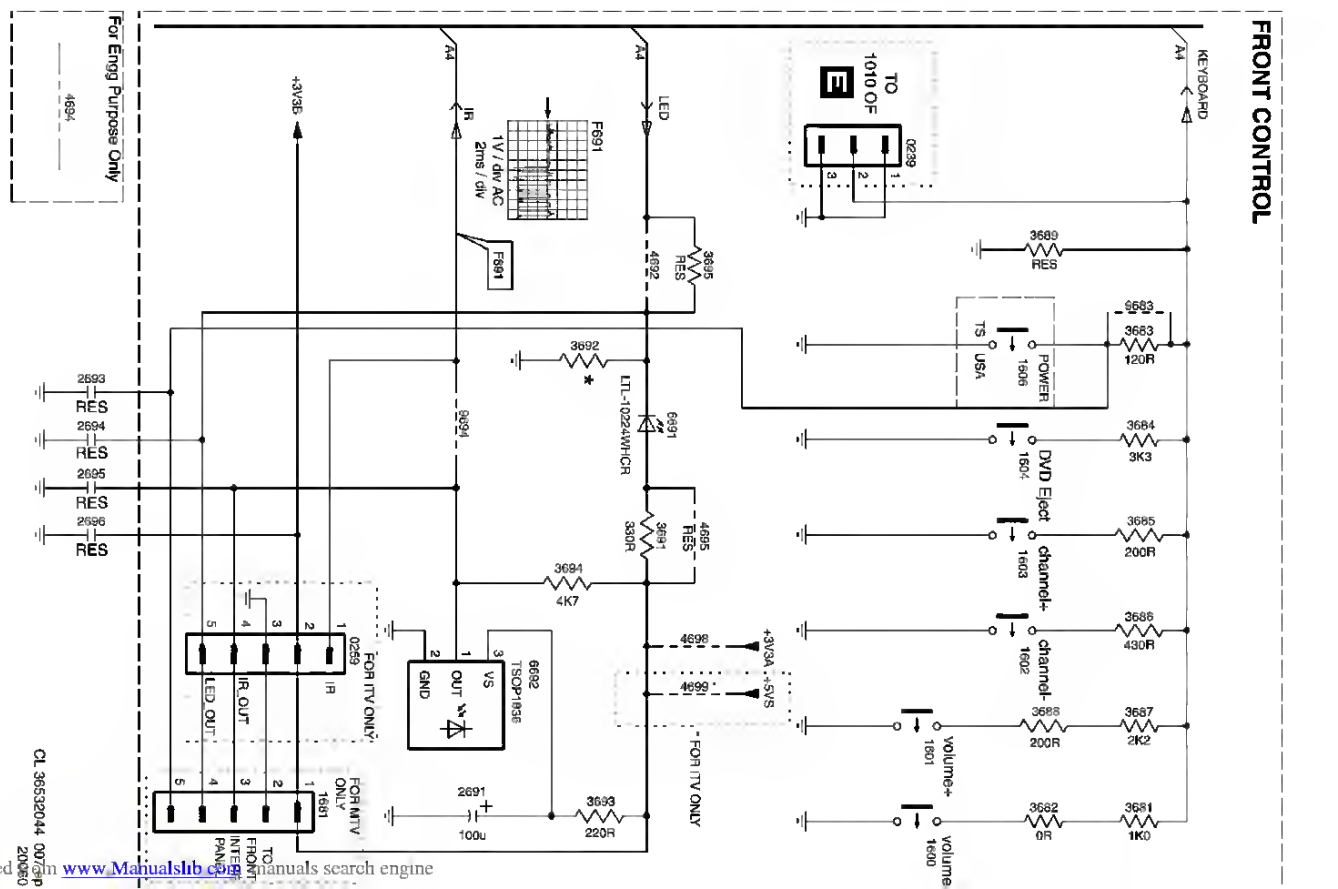

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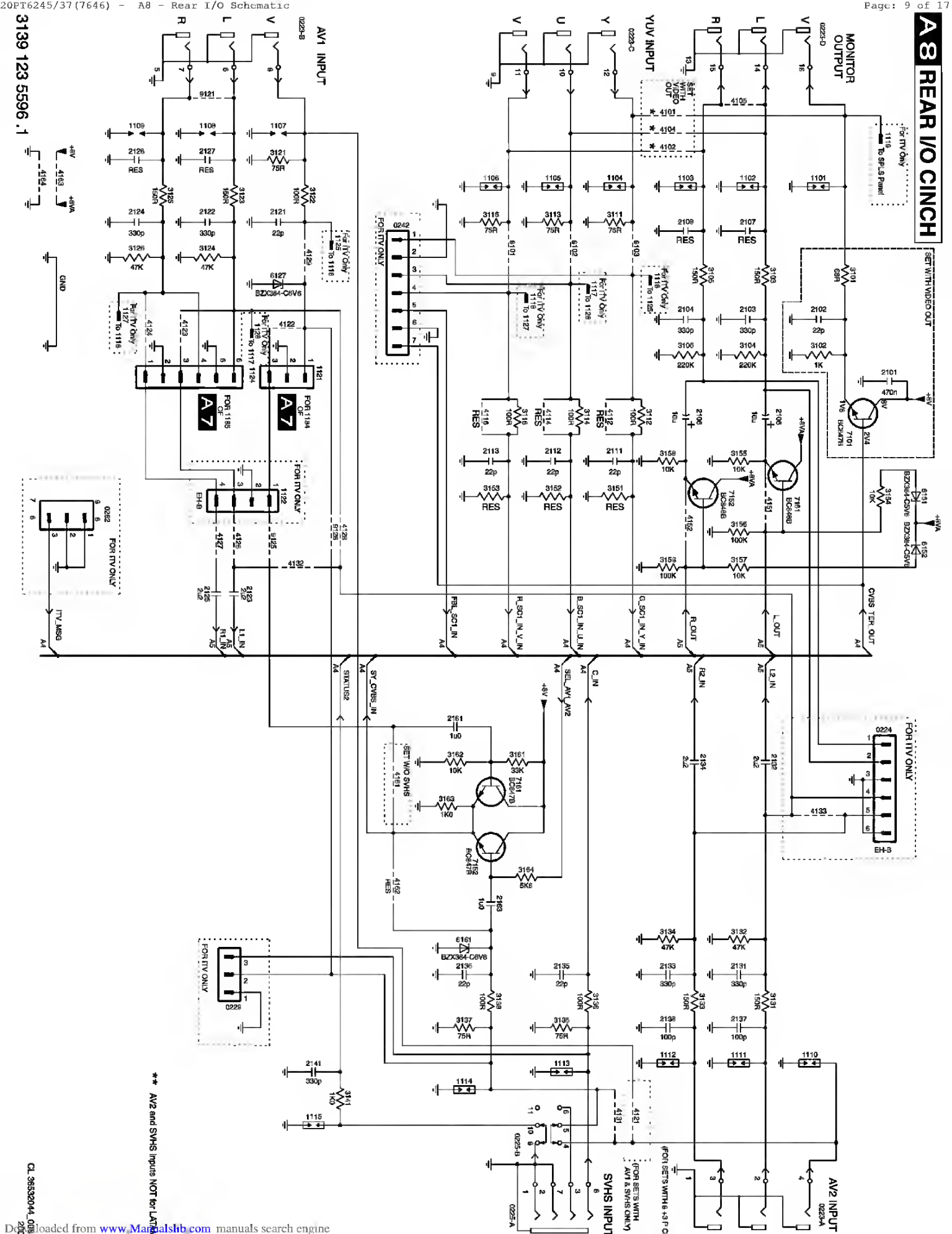

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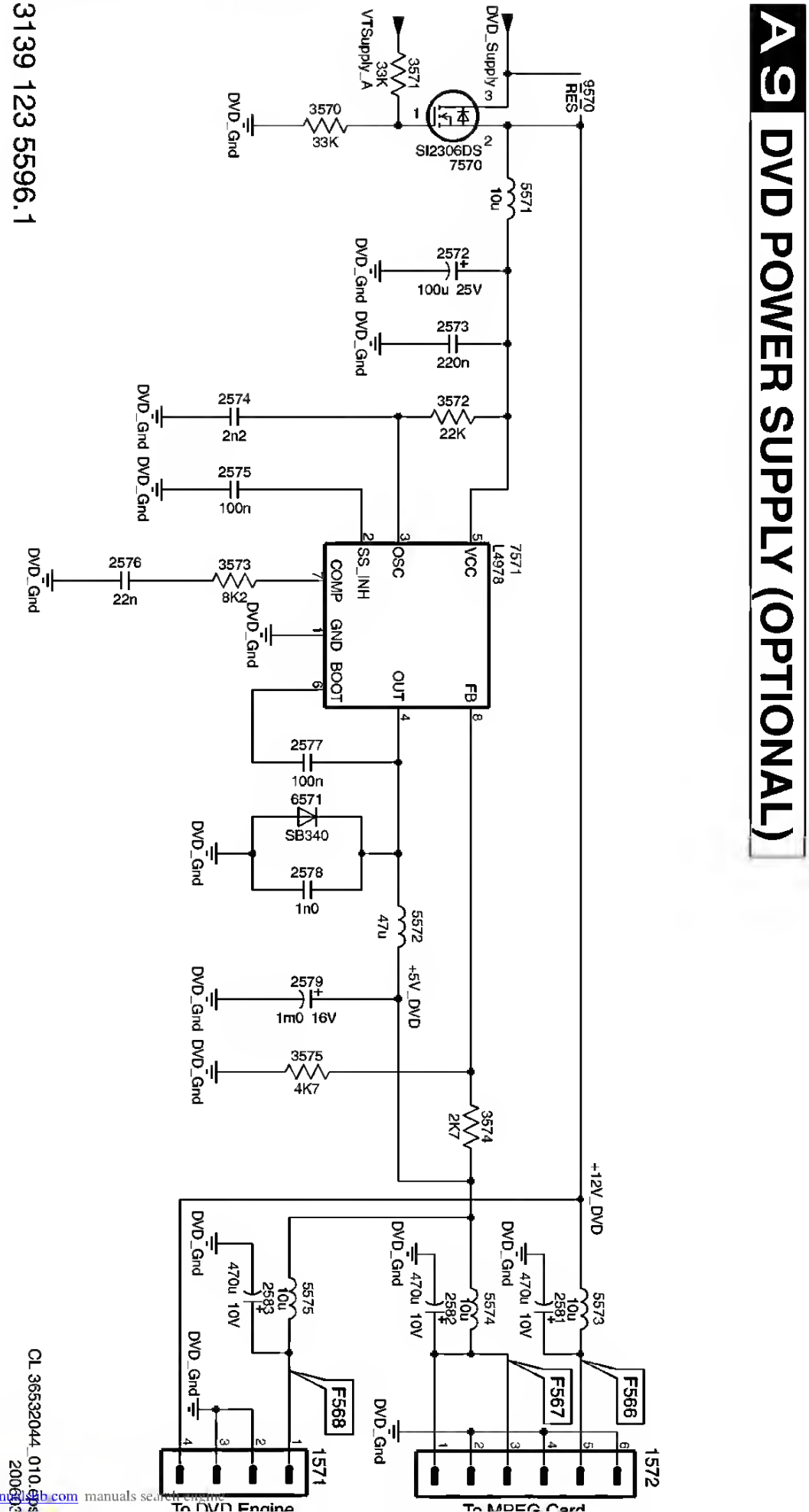

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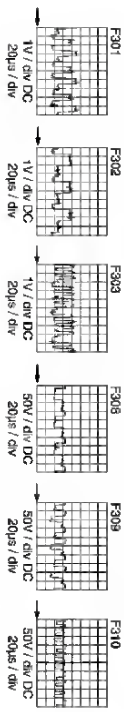
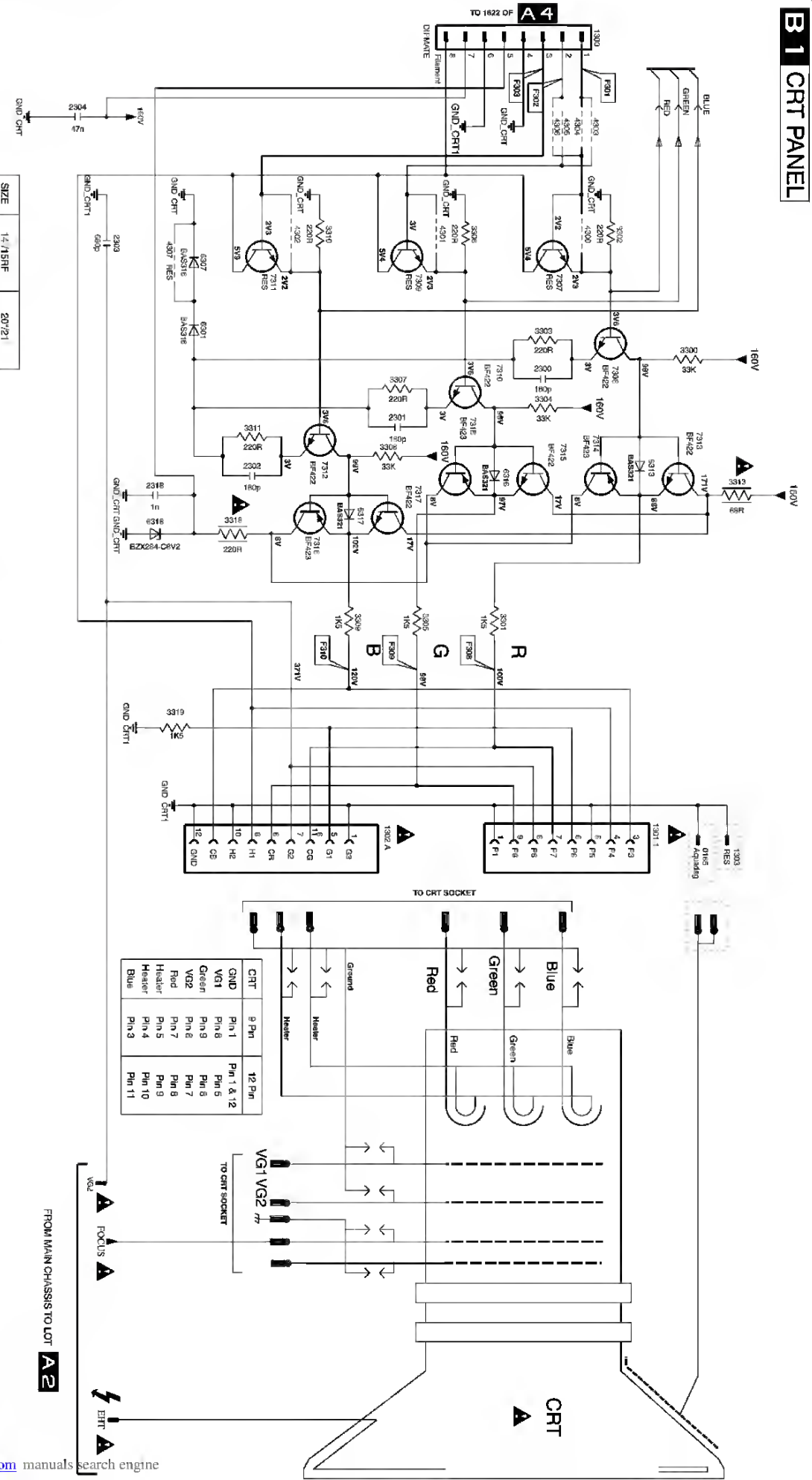
B 1 CRT PANEL

3139 123 5604.1

	SIZE		
1301	SOC M-NECK	14"/15RF	SOC N-NECK
1302	-	-	-
3311	330R	390R	SM JUMP
4303	-	-	-
4304	SM JUMP	SM JUMP	-
4305	SM JUMP	-	SM JUMP
4306	-	-	-





CRT	9 Pin	12 Pin
GND	Pin 1	Pin 1 & 12
VG1	Pin 6	Pin 5
Green	Pin 9	Pin 6
VG2	Pin 8	Pin 7
Red	Pin 7	Pin 8
Heater	Pin 5	Pin 9
Heater	Pin 4	Pin 10
Blue	Pin 3	Pin 11

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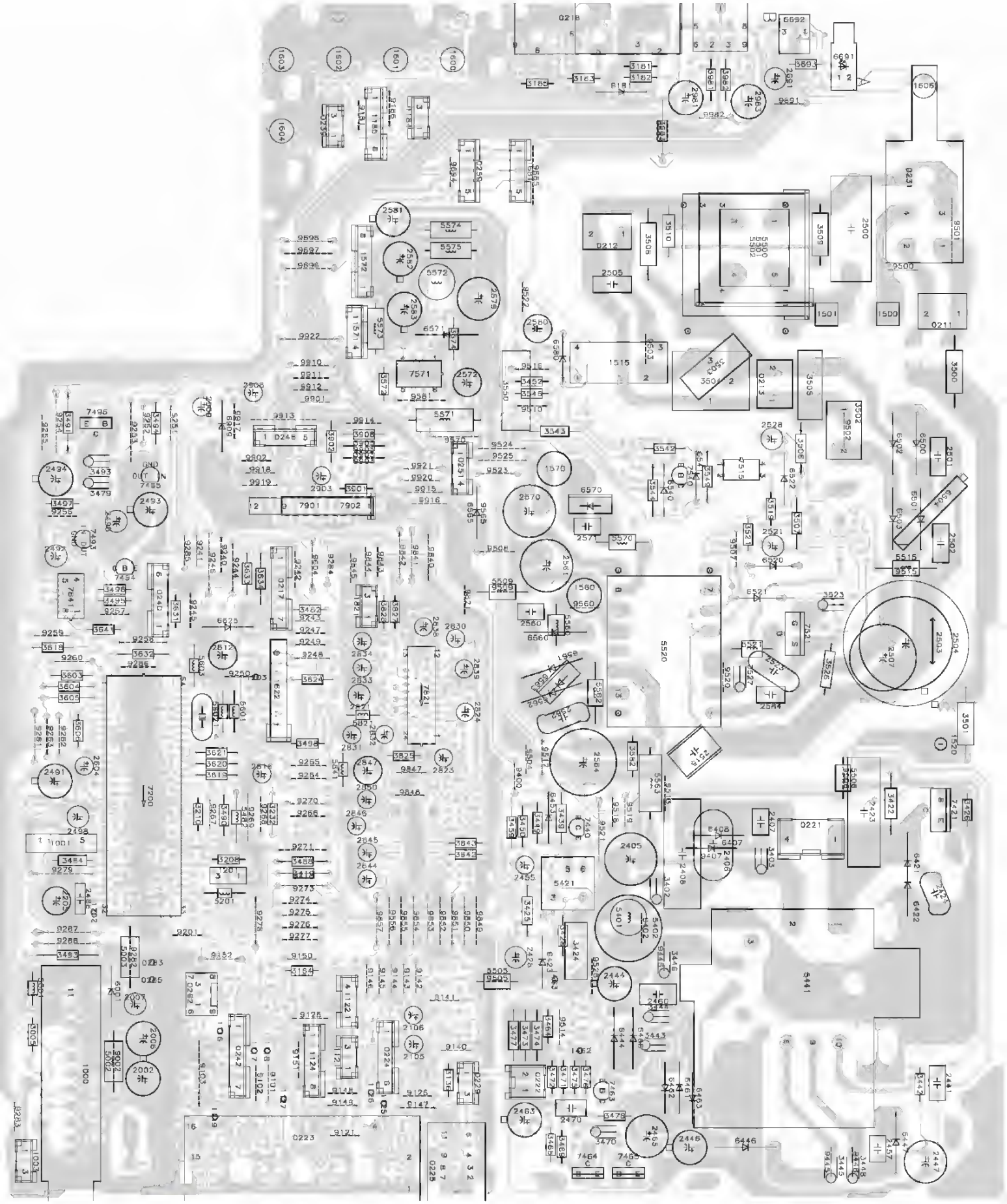

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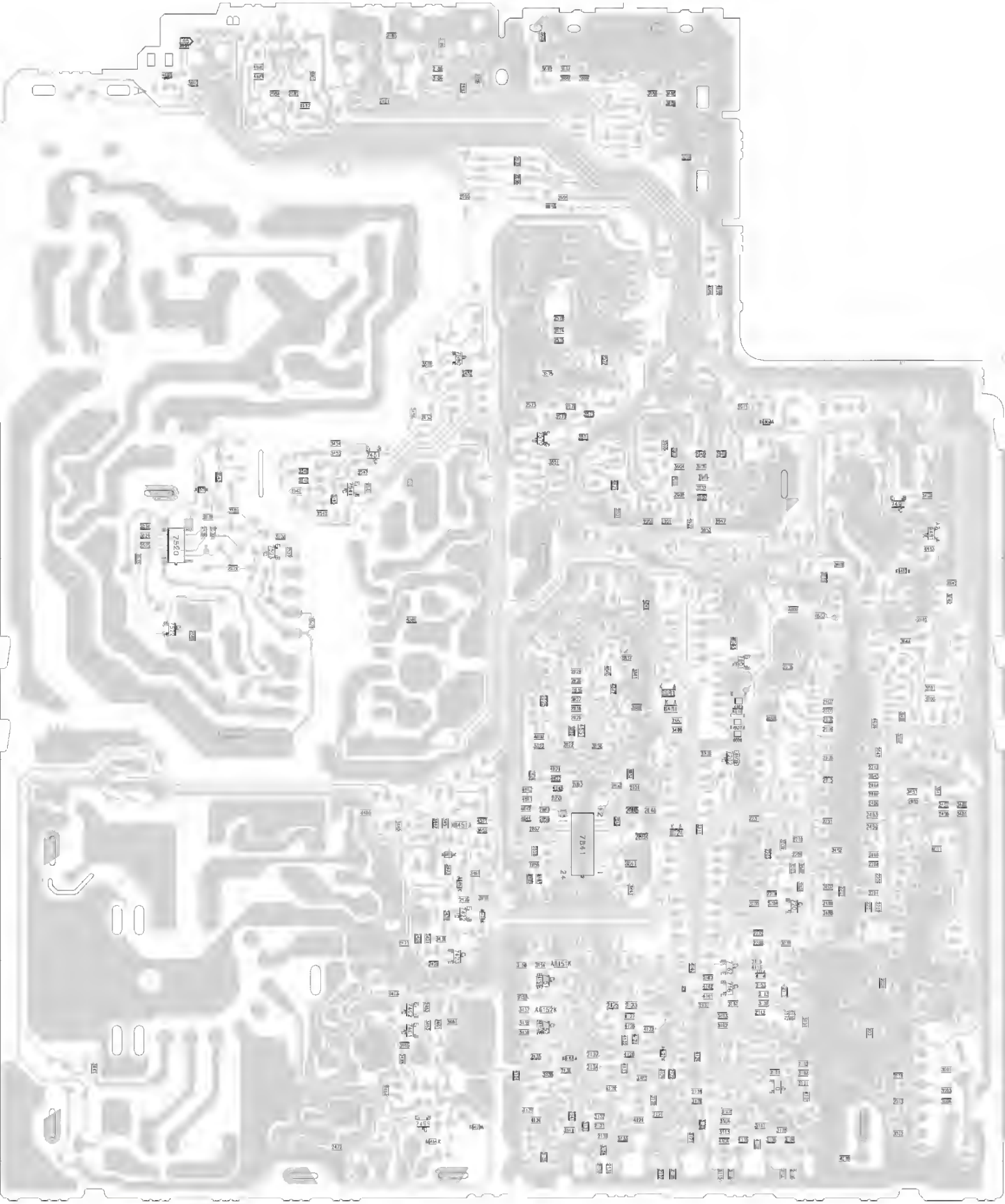

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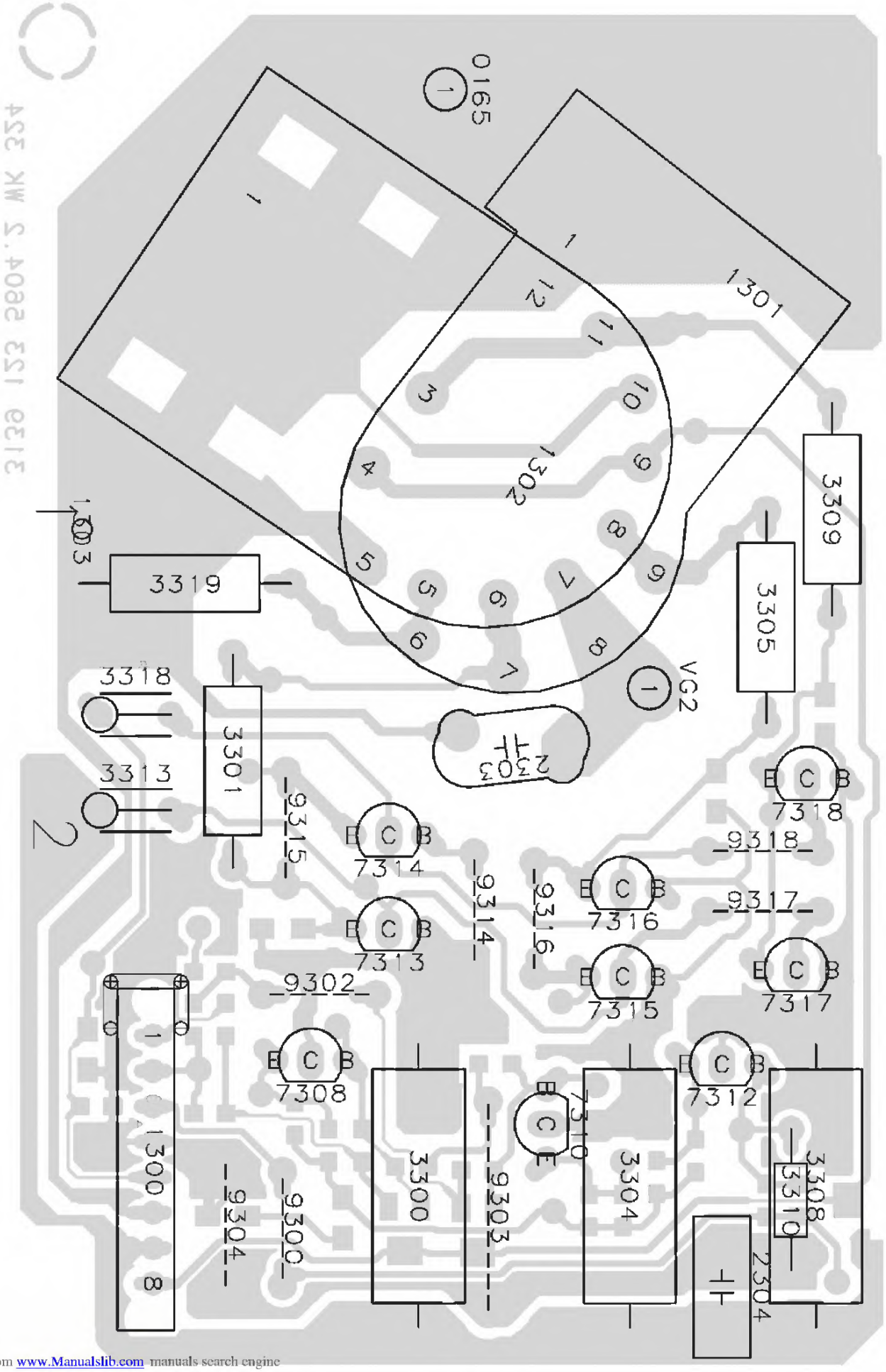

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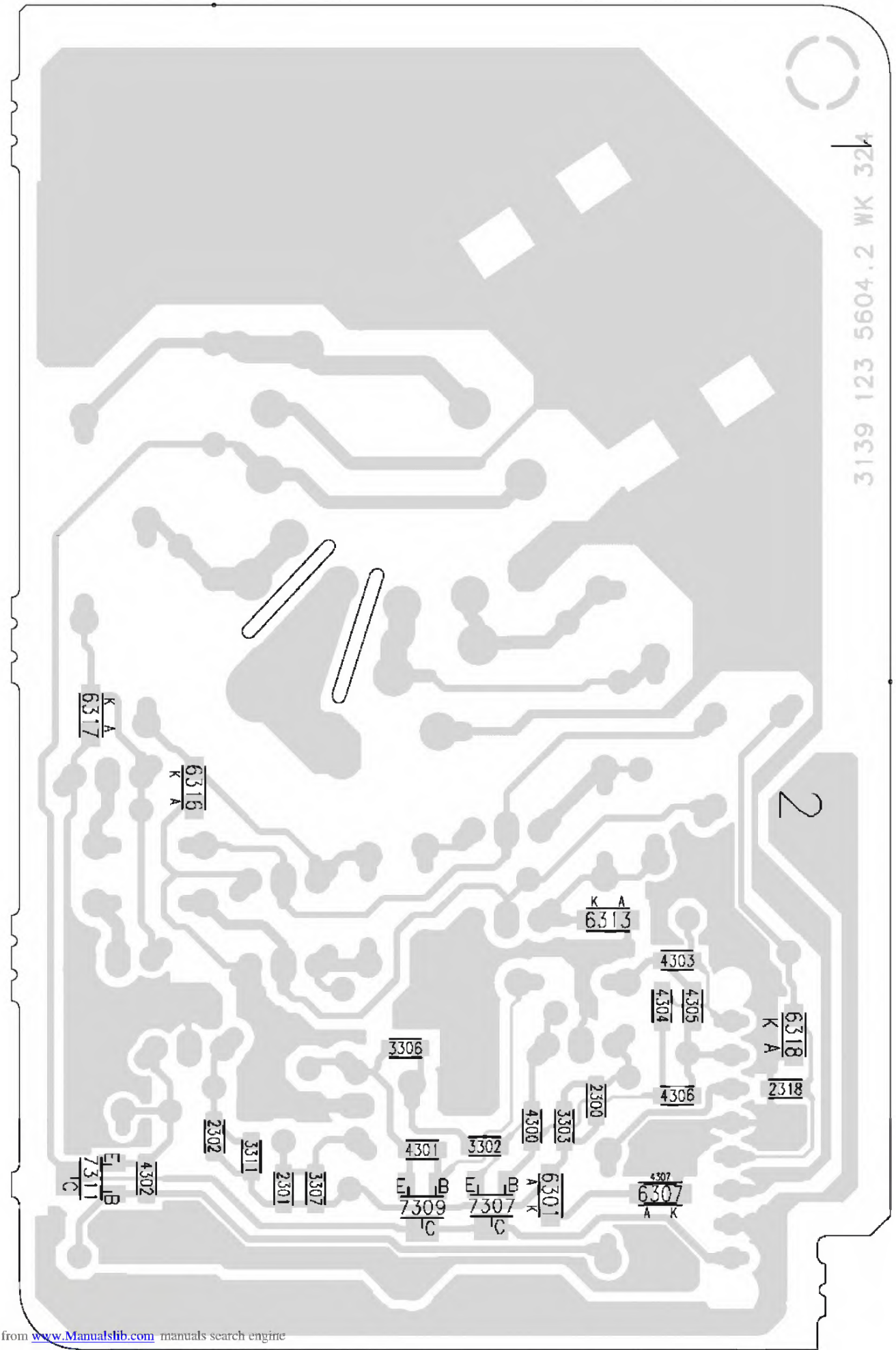

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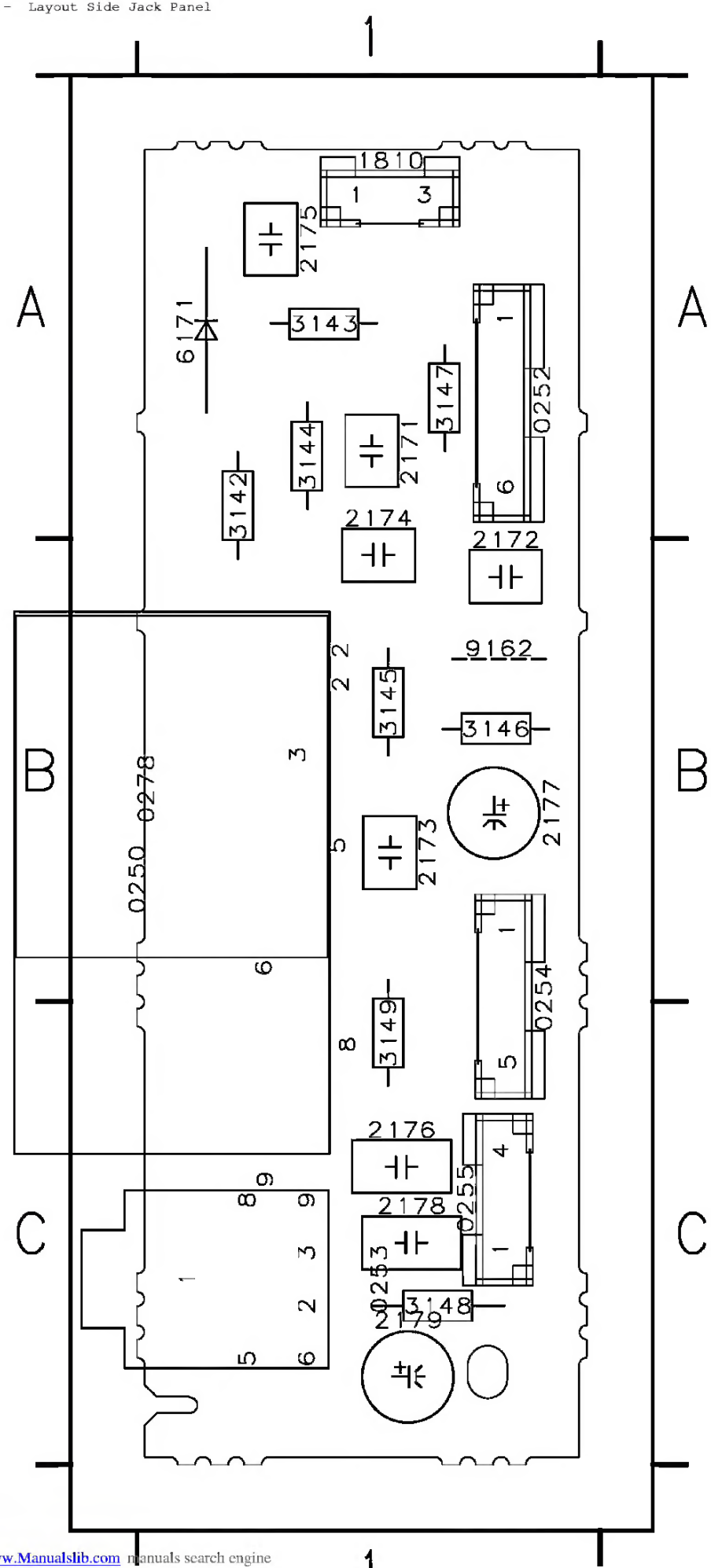

0250 B1
0252 A1
0253 C1
0254 C1
0255 C1
0278 B1
1810 A1
2171 A1
2172 B1
2173 B1
2174 B1
2175 A1
2176 C1
2177 B1
2178 C1
2179 C1
3142 A1
3143 A1
3144 A1
3145 B1
3146 B1
3147 A1
3148 C1
3149 C1
6171 A1
9162 B1

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